

# THE MONTREAL PROTOCOL AND GLOBAL WARMING

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## HEARING

BEFORE THE

COMMITTEE ON OVERSIGHT  
AND GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

MAY 23, 2007

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## THE MONTREAL PROTOCOL AND GLOBAL WARMING

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WEDNESDAY, MAY 23, 2007

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM,  
*Washington, DC.*

The committee met, pursuant to notice, at 10 a.m. in room 2154, Rayburn House Office Building, the Honorable Henry A. Waxman (chairman of the committee) presiding.

Present: Representatives Waxman, Clay, Watson, McCollum, Hodes, Sarbanes, Davis of Virginia, Mica, Platts, Issa, Foxx, Sali, and Jordan.

Staff present: Phil Barnett, staff director and chief counsel; Kristin Amerling, general counsel; Karen Lightfoot, communications director and senior policy advisor; Greg Dotson, chief environmental counsel; Jeff Baran, counsel; Molly Gulland, assistant communications director; Earley Green, chief clerk; Teresa Coufal, deputy clerk; Caren Auchman, press assistant; Zhongrui "JR" Deng, chief information officer; Leneal Scott, information systems manager; Miriam Edelman and Kerry Gutknecht, staff assistants; David Marin, minority staff director; Larry Halloran, minority deputy staff director; Jennifer Safavian, minority chief counsel for oversight and investigations; Keith Ausbrook, minority general counsel; A. Brooke Bennett, minority counsel; Kristina Husar, minority professional staff member; Larry Brady, minority senior investigator and policy advisor; Patrick Lyden, minority parliamentarian and member service coordinator; Brian McNicoll, minority communications director; and Benjamin Chance, minority clerk.

Chairman WAXMAN. The meeting of the committee will come to order.

Before we proceed with today's hearing, I want to note that we have a new member of the committee with us today, Representative Jim Jordan from Ohio. Mr. Jordan served for over a decade in the Ohio State Legislature before his election to Congress last fall.

Mr. Jordan, I want to welcome you to the committee and look forward to working with you.

Let me yield to Mr. Davis at this point to welcome our new member today.

Mr. DAVIS OF VIRGINIA. Thank you, Mr. Chairman.

I am pleased to have Jim Jordan as the newest member of our committee. We look forward to his active participation in our hearings and markups, although he has a markup in another committee as we speak, so he will get used to running back and forth. But his experience in the Ohio State Legislature is going to benefit the

work we do here on oversight and government reform. He represents Ohio's 4th District. He understands the issues facing families in the heartland of America.

Welcome, Jim.

Chairman WAXMAN. Thank you. I want to ask unanimous consent that Mr. Jordan be assigned to serve as a member of the Subcommittee on Federal Workforce, Postal Service, and the District of Columbia.

Without objection, that will be the order.

Mr. JORDAN. Thank you.

Chairman WAXMAN. Thank you. Welcome to you.

The purpose of today's hearing is to find out whether there are ways to use the world's most successful environmental treaty, the Montreal Protocol, to tackle one of the world's gravest threats, global warming.

The public is beginning to understand the dangers of global warming. There is a growing awareness that if the Nation and the world do not act, global warming could cause more floods, more droughts, more heat waves, stronger hurricanes, the extinction of 20 to 30 percent of the world's species, the spread of diseases like malaria, the loss of our coastlines.

But what few people realize is that there are simple, affordable steps that we can take now that can make a big difference. The risks are large, but the situation is far from hopeless. There are cost-effective options for tackling climate change, and we have the power to reduce the dangers of global warming if we choose to act.

At today's hearing we are going to learn of one step we could take that would make a huge impact at virtually no cost. Using the Montreal Protocol, we can eliminate the equivalent of 1 billion tons of carbon dioxide emissions. That is an enormous amount of emissions. It is equal to roughly half of the total emissions reductions required under the Kyoto Protocol, yet the cost could be as low as 50 cents per ton, between just \$500 million and \$1.5 billion globally.

We can achieve half the global warming impact of Kyoto at a global cost of just \$1 billion by taking one simple step: accelerating the phase-out of ozone-depleting hydrochlorofluorocarbons, or HCFCs. HCFCs are used in air conditioners and refrigerators. There are low-cost substitutes currently on the market, so banning HCFCs would be inexpensive. But because HCFCs are extraordinarily potent greenhouse gases, eliminating HCFCs would have the same impact on global warming as removing 20 million cars from the road.

The Montreal Protocol was negotiated 20 years ago in order to stop the depletion of the stratospheric ozone layer by human-produced chemicals, such as chlorofluorocarbons and hydrochlorofluorocarbons. The treaty is widely recognized as a tremendous success when it comes to protecting the ozone layer.

As a result of the Montreal Protocol's legally binding controls on the production and consumption of ozone-depleting substances, global emissions of these gases has dropped to a small fraction of their 1990 levels. Although we still have a way to go, the ozone layer is on the path to recovery.

At the same time, the Montreal Protocol has helped protect the planet from global warming. Today we will hear about a scientific paper which finds that the Montreal Protocol has had the effect of delaying global warming impacts by 7 to 12 years. This new analysis shows that the world would be a decade closer to catastrophic climate change without the Montreal Protocol.

A new round of negotiations over the Montreal Protocol is scheduled for September, yet few people are aware of the role this protocol has played in slowing down global warming, and virtually no one in Congress knows that by further strengthening the Montreal Protocol in the upcoming negotiations, we can make a major positive contribution to reducing emissions of greenhouse gases.

Global warming is an enormous challenge. To fight global warming we will need to increase energy efficiency. We will have to reduce emissions from transportation and electricity generation. We need to move away from the dirty technologies of the past and embrace new, clean technologies. But, as we will learn today, there are also simple steps with dramatic effects that we can take now if we are creative and listen to what scientists are saying.

I look forward to hearing the testimony of the witnesses and I thank them for being here.

[The prepared statement of Chairman Henry A. Waxman follows:]

**Statement of  
Chairman Henry A. Waxman, Chairman  
Committee on Oversight and Government Reform  
Hearing on  
Achievements and Opportunities for Climate Protection  
Under the Montreal Protocol**

**May 23, 2007**

The purpose of today's hearing is to find out whether there are ways to use the world's most successful environmental treaty -- the Montreal Protocol -- to tackle one of the world's gravest threats: global warming.

The public is beginning to understand the dangers of global warming. There is a growing awareness that if the nation and the world do not act, global warming could cause more floods. More droughts. More heat waves. Stronger hurricanes. The extinction of 20% to 30% of the world's species. The spread of diseases like malaria. The loss of our coastlines.

But what few people realize is that there are simple, affordable steps that we can take now that can make a big difference. The risks are large, but the situation is far from hopeless. There are cost-effective options for tackling climate change. We have the power to reduce the dangers of global warming if we choose to act.

At today's hearing, we are going to learn of one step we could take that would make a huge impact at virtually no cost. Using the Montreal Protocol, we can eliminate the equivalent of one billion tons of carbon dioxide emissions. That's an enormous amount of emissions. It's equal to roughly half of the total emissions reductions required under the Kyoto Protocol. Yet the cost could be as low as 50 cents per ton – between just \$500 million and \$1.5 billion globally.

We can achieve half the global warming impact of Kyoto at a global cost of just a billion dollars by taking one simple step: accelerating the phase-out of ozone-depleting hydrochlorofluorocarbons, or HCFCs.

HCFCs are used in air conditioners and refrigerators. There are low-cost substitutes currently on the market, so banning HCFCs would be inexpensive. But because HCFCs are extraordinarily potent greenhouse gasses, eliminating HCFCs would have the same impact on global warming as removing 20 million cars from the road.

The Montreal Protocol was negotiated 20 years ago in order to stop the depletion of the stratospheric ozone layer by human-produced chemicals such as chlorofluorocarbons and hydrochlorofluorocarbons. The treaty is widely recognized as a tremendous success when it comes to protecting the ozone layer. As a result of the Montreal Protocol's legally binding controls on the production and consumption of ozone depleting substances, global emissions of these gases has dropped to a small fraction of their 1990 levels. Although we still have a way to go, the ozone layer is on the path to recovery.

At the same time, the Montreal Protocol has helped protect the planet from global warming. Today, we'll hear

about a scientific paper which finds that the Montreal Protocol has had the effect of delaying global warming impacts by seven to twelve years. This new analysis shows that the world would be a decade closer to catastrophic climate change without the Montreal Protocol.

A new round of negotiations over the Montreal Protocol is scheduled for September. Yet few people are aware of the role of the Montreal Protocol has played in slowing down global warming. And virtually no one in Congress knows that by further strengthening the Montreal Protocol in the upcoming negotiations, we can make a major positive contribution to reducing emissions of greenhouse gases.

Global warming is an enormous challenge. To fight global warming, we will need to increase energy efficiency. We'll have to reduce emissions from transportation and electricity generation. We'll need to move away from the dirty technologies of the past and embrace new, clean technologies.

But as we will learn today, there are also simple steps with dramatic effects that we can take now if we are creative and listen to what scientists are saying.

I look forward to hearing the testimony of the witnesses and thank them for being here.

Chairman WAXMAN. I want to recognize Mr. Davis for his opening statement.

Mr. DAVIS OF VIRGINIA. Thank you very much, Mr. Chairman, for holding today's hearing to consider the achievements and the opportunities for climate protection under the Montreal Protocol.

Climate change is a critically important issue, and as policy-makers it is our job to consider all sensible options to reduce the emission of greenhouse gases. I am motivated to learn more about what we can do to advance the debate with potential solutions, and I think this hearing can serve as an example of how we, as a committee, can work together to rationally investigate the facts surrounding climate change, and at the same time seek agreement on the way forward.

I am beginning to agree with some of the European climate change scientists who object to the Hollywood-ization of this issue because it further politicizes the debate and it makes rational consensus building a little more difficult to achieve, but while hyperbole and partisan accusations are good for grabbing headlines, they are not as productive a component of the deliberative process as hearings like this, so I am grateful the committee is pursuing this instructive line of inquiry today.

Further, I think that the Montreal Protocol, itself, can serve as a model for international agreement on environmental issues. In the 1980's the United States was the world's leading producer of CFCs. Even so, the Reagan administration took the lead in negotiating an international agreement to reduce the emissions of CFCs. Ultimately, the Senate unanimously approved the Montreal Protocol. President Reagan signed the treaty saying that, "The protocol marks an important milestone for the future quality of the global environment and for the health and well-being of all peoples of the world."

Since the Montreal Protocol was signed in 1987, the United States has achieved a 90 percent reduction in the production and consumption of ozone-depleting substances, thus ending the production and import of over 1.7 billion pounds per year of these chemicals. Between 1989 and 1995, global emissions of CFCs dropped 60 percent worldwide. The reduction in emissions has proved a measurable benefit to the global environment, and some studies have shown the depletion of the ozone layer may be slowing due to the international ban on CFCs.

Today the Bush administration is involved in international negotiations over accelerating the phase-out of HCFCs, which could have strongly beneficial results for all of us, but we need facts. One of the reasons the administration did not wish to testify this morning is they are still trying to quantify the benefits of the changes attributable to the protocol. But I am grateful for our witnesses coming forward. I wish the administration had come forward.

I look forward to hearing the testimony of today's witnesses. I hope they can help shed some light on the benefits emanating from the Montreal Protocol to both the ozone layer and the effort to reduce greenhouse gases.

Thank you.

[The prepared statement of Hon. Tom Davis follows:]

HENRY A. WAXMAN, CALIFORNIA  
CHAIRMAN

TOM DAVIS, VIRGINIA  
RANKING MINORITY MEMBER

ONE HUNDRED TENTH CONGRESS

**Congress of the United States**

**House of Representatives**

COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

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**Statement of Rep. Tom Davis**

**Ranking Member**

**Committee on Oversight and Government Reform**

**“Achievements and Opportunities for Climate Protection under the Montreal Protocol”**

**May 23, 2007**

Thank you, Mr. Chairman, for holding today’s hearing to consider the achievements and opportunities for climate protection under the Montreal Protocol. Climate change is a critically important issue and, as policy makers, it’s our job to consider all sensible options to reduce the emission of greenhouse gases.

My head is not in the sand on this issue. I’m not one who denies the reality of climate change, and I’m motivated to learn more about what we can do to advance the debate and potential solutions.

Therefore, I think this hearing can serve as an example of how we as a Committee can work together to rationally investigate the facts surrounding climate change and at the same time seek agreement on the way forward. I am beginning to agree with some European climate change scientists who object to the “Hollywood-ization” of this issue, because it further politicizes the debate and makes rational consensus-building more difficult. While hyperbole and partisan accusations are good for grabbing headlines, they are not a productive component of the deliberative process. So I’m grateful the Committee is pursuing this instructive line of inquiry today.

Furthermore, I believe that the Montreal Protocol itself can serve as a model for international agreement on environmental issues.

In the 1980’s, the United States was the world’s leading producer of chlorofluorocarbons (also known as CFCs). Even so, the Reagan Administration took the lead in negotiating an international agreement to reduce emissions of CFCs. Ultimately, the U.S. Senate unanimously approved the Montreal Protocol, and President Reagan signed the treaty, saying that, “The Protocol marks an important milestone for the future quality of the global environment and for the health and well being of all peoples of the world.”

Since the Montreal Protocol was signed in 1987, the U.S. has achieved a 90 percent reduction in the production and consumption of ozone-depleting substances, thus ending the production and import of over 1.7 billion pounds per year of these chemicals. Between 1989 and 1995, global emissions of CFCs dropped 60 percent worldwide.

The reduction in CFC emissions has provided a measurable benefit to the global environment, and some studies have shown the depletion of the ozone layer may be slowing due to the international ban on CFCs.

Today, the Bush Administration is involved in international negotiations over accelerating the phase-out of HCFC's, which could have strongly beneficial results for all of us. But we need facts, and one of the reasons the Administration did not wish to testify this morning is they are still trying to quantify the benefits of the changes attributable to the Protocol.

I look forward to hearing the testimony of today's witnesses and hope they can help shed some light on the benefits emanating from the Montreal Protocol to both the ozone layer and the effort to reduce greenhouse gases.

Chairman WAXMAN. Without objection, all Members will have an opportunity to insert an opening statement in the record.

I would like to now proceed to our witnesses. We have Dr. Guus Velders, who works at the Netherlands Environmental Assessment Agency as a senior scientist on ozone layer depletion, climate change, and air quality. He was the lead author of the 1998 and 2006 World Meteorological Organization—United Nations Environmental Program “Scientific Assessment of Ozone Depletion.” He is also lead coordinating author of the Intergovernmental Panel on Climate Change “Special Report on Ozone Layer Depletion and Climate Change.” Dr. Velders is testifying in his individual capacity.

Mr. Allan Thornton is the executive director of the Environmental Investigation Agency, a nonprofit, nongovernmental organization that has extensive expertise on the Montreal Protocol. In 2006, EPA awarded the organization the Stratospheric Ozone Protection Award.

Dr. Mack McFarland is the Global Environmental Manager for DuPont’s fluora chemicals business. Before joining DuPont in 1983, he was an atmospheric scientist at the National Oceanic and Atmospheric Administration.

I want to thank you all for being here today. We look forward to your testimony.

It is the practice of this committee that all witnesses be sworn in, because it is the Oversight Committee, so I would like to ask you, if you would, please rise and raise your right hands.

[Witnesses sworn.]

Chairman WAXMAN. The record will indicate that each of the witnesses answered in the affirmative.

Dr. Velders, why don’t we start with you.

**STATEMENTS OF GUUS VELDEERS, NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY; ALLAN THORNTON, EXECUTIVE DIRECTOR, ENVIRONMENTAL INVESTIGATION AGENCY; AND MACK MCFARLAND, ENVIRONMENTAL FELLOW, DUPONT FLUOROPRODUCTS**

**STATEMENT OF GUUS VELDEERS**

Mr. VELDEERS. Good morning, Chairman Waxman and members of the committee. Thank you for giving me this opportunity to share the results of our research with you.

The 1987 Montreal Protocol restricting the production and use of ozone-depleting substances has helped to both reduce global warming and protect the ozone layer. Without its protocol, the amount of heat trapped due to ozone-depleting substances would be twice as much as it is today. The benefits to climate already achieved to date by the Montreal Protocol and its amendments, alone, greatly exceeds the current targets of the Kyoto Protocol. Potential future effects of a strengthened Montreal Protocol on climate are still significant and will decrease in the future. Future emission reductions of Kyoto gases will potentially have a much larger effect on climate.

CFCs and other ozone-depleting substances are now globally recognized as the main cause of the observed depletion of the ozone layer. In 1974 Molina and Rowland provided an early warning

when they first recognized the potential of CFCs to deplete stratospheric ozone. Concern was further heightened in 1985 by the discovery of the ozone hole over Antarctica. The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer formally recognized the significant threat of ozone-depleting substances to the ozone layer and provided a mechanism to reduce and phaseout global production and use of these compounds.

As a consequence, the production, use, and emissions of the major ozone-depleting substances have decreased significantly. The concentrations in the atmosphere of these major ozone-depleting substances are also decreasing.

There is now emerging evidence that the ozone layer is currently starting to recover. Full recovery is not expected until the second half of this century. Future emissions of ozone-depleting and climate change may delay or accelerate the recovery of the ozone layer by several years.

Ozone-depleting also contribute to the radiative forcing of climate change. Their current contribution is about 20 percent of that of carbon dioxide. The Kyoto Protocol of 1987 [sic] is a treaty for reducing the emissions of CO<sub>2</sub>, the leading greenhouse gas, and five other gases. These gases do not deplete the ozone layer, but include hydrofluorocarbons [HFCs], which are produced as alternatives for ozone-depleting substances. The substances that do deplete the ozone layer are not included in the United Nations Framework Convention of Climate Change [UNFCCC], and its Kyoto Protocol, because they were already covered by the Montreal Protocol.

The Montreal Protocol has helped both to protect the ozone layer and to reduce global warming. My research shows that, without reductions achieved under this protocol, the amount of heat trapped due to ozone-depleting substances may have been about twice as much as it is today. This is equivalent to a gain of about 10 years in reductions of CO<sub>2</sub> emissions.

The climate change benefits which have already been achieved by the Montreal Protocol, alone, are, according to my research, five to six times greater than the current reduction targets for 2008–2012 of the Kyoto Protocol, assuming full compliance. It is estimated that the Montreal Protocol may have avoided emissions of about 11 billion tons of CO<sub>2</sub>-equivalent by 2010. However, these benefits attributed to the Montreal Protocol will decrease further and further as ozone-depleting substances are being phased out under the Montreal Protocol.

New measures under a strengthened Montreal Protocol can result in additional benefits for both the ozone layer and climate. The IPCC assessed the potential and cost-effectiveness of such measures. Removing CFCs present in existing applications—that is refrigerators and foams, mainly—can reduce emissions by about 120 million tons of CO<sub>2</sub> per year by 2015. An accelerated phase-out of the production of HCFCs in developed and developing countries could be achieved with instruments similar to those currently in the Montreal Protocol. This can additionally reduce emissions by about 340 million tons per year of CO<sub>2</sub> by 2015, and potentially about 800 to 900 million tons by 2030.

These possible emission reductions would derive mainly from better containment in refrigeration and destruction of ozone-depleting

substances present in existing refrigerators and foams. Detailed scientific and technology assessments could provide policymakers with the information necessary to fine-tune an accelerated HCFC phase-out to allow specific uses of HCFCs. Examples are use of HCFCs as feedstock for fluoropolymers and in other applications where emissions are near zero or where overriding energy efficiency benefits exist and efficiency benefits are present.

Thus, plausible scenarios that could achieve reductions in CO<sub>2</sub>-equivalent emissions of ozone-depleting substances and alternative gases both exist and have been considered. These reductions are comparable to the reduction target of the first commitment period of the Kyoto Protocol, but relatively small compared to the current global CO<sub>2</sub> emissions.

It is widely acknowledged that emission reductions exceeding those laid down for the first commitment period of the Kyoto Protocol will be needed to achieve the UNFCCC objective, namely, stabilization of greenhouse gases concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. While emissions reductions under the Montreal Protocol have played an important role in the past, future amendments can still have additional benefits for climate, reductions of greenhouse gases not covered by the Montreal Protocol have a potentially much larger effect on climate.

In conclusion, I think the success of the Montreal Protocol is also important, for it shows the effectiveness of an international agreement.

Chairman Waxman, thank you.

[The prepared statement of Mr. Velders follows:]



Netherlands Environmental  
Assessment Agency

Hearing on "Achievements and Opportunities for Climate Protection under the Montreal Protocol", US House Committee on Oversight and Government Reform, May 23, 2007

**Statement of Dr. Guus Velders (The Netherlands) on "Dual benefits of the Montreal Protocol: protecting Ozone layer and Climate"**

The 1987 Montreal Protocol – restricting the production and use of ozone-depleting substances – has helped to both reduce global warming and protect the ozone layer. Without this protocol, the amount of heat trapped due to ozone-depleting substances would be twice as much as it is today. The benefits to the climate achieved to date by the Montreal Protocol and its amendments alone greatly exceed the current target of the Kyoto Protocol. Potential future effects of a strengthening of the Montreal Protocol on climate are still significant, but will decrease in the future, while future emission reductions of the Kyoto gases will potentially have a much larger effect on the climate.

**Depletion of the ozone layer**

Chlorofluorocarbons (CFCs) and other ozone-depleting substances are now globally recognized as the main cause of the observed depletion of the ozone layer. In 1974, Molina and Rowland provided an "early warning", when they first recognized the potential of CFCs to deplete stratospheric ozone. Concern was further heightened in 1985 by the discovery of the ozone hole over Antarctica. The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer formally recognized the significant threat of ozone-depleting substances to the ozone layer and provided a mechanism to reduce and phase out global production and use of these compounds. As a consequence, the production, use, and emissions of the major ozone-depleting substances have decreased significantly. The concentrations in the atmosphere of the major ozone-depleting substances are also decreasing<sup>1</sup>. An exception is formed the hydrochlorofluorocarbons (HCFCs), with increasing concentrations in the atmosphere.

There is emerging evidence that the ozone layer is currently starting to recover. Full recovery is expected around 2050-2075. Future emissions of ozone-depleting substances and climate change may delay or accelerate the recovery of the ozone layer by several years<sup>1</sup>.

**Greenhouse gases and climate change**

Ozone-depleting substances also contribute to the radiative forcing of climate change. Their current contribution is about 20% of that of carbon dioxide (CO<sub>2</sub>). The Kyoto Protocol of 1997 is a treaty for reducing the emission of CO<sub>2</sub>, the leading greenhouse gas, and five other gases. These gases do not deplete the ozone layer, but include hydrofluorocarbons (HFCs) which are produced as alternatives for ozone-depleting substances. Substances that do deplete the ozone layer, are not included in the UN Framework Convention of Climate Change (UNFCCC) and its Kyoto Protocol, because they were already covered by the Montreal Protocol.

The Montreal Protocol has helped both to protect the ozone layer, and to reduce global warming. My research<sup>2</sup> shows that without the reductions achieved under this protocol, the amount of heat trapped due to ozone-depleting substances may have been about twice as much as it is today.

This is equivalent to a gain of about 10 years in CO<sub>2</sub> reductions. The climate benefits which have already been achieved by the Montreal Protocol alone, are, according to my research, 5 to 6 times greater than the current reduction target, for 2008-2012, of the Kyoto Protocol, assuming full compliance. It is estimated that the Montreal Protocol may have avoided emissions of about 11 GtCO<sub>2</sub>-eq/yr (11 billion tonnes of CO<sub>2</sub>-equivalent emissions) by 2010. However, these climate benefits attributed to the Montreal Protocol will decrease further and further as ozone-depleting substances are being phased out. ✓

#### Future benefits

New measures under a strengthened Montreal Protocol can result in additional benefits for both the ozone layer and climate. IPCC<sup>3</sup> assessed the potential and cost-effectiveness of such measures. Removing CFCs present in existing applications (refrigerators, foams) can reduce emissions by about 0.12 GtCO<sub>2</sub>-eq/yr by 2015. An accelerated phase-out of the production of HCFCs in developed and developing countries could be achieved with instruments similar to those currently in the Montreal Protocol. This can reduce emissions by about 0.34 GtCO<sub>2</sub>-eq/yr by 2015 and potentially by 0.8-0.9 GtCO<sub>2</sub>-eq/yr by 2030.

Associated additional reductions of about 0.30 GtCO<sub>2</sub>-eq/yr by 2015 can be achieved in HFC emissions, which are released as a byproduct of HCFC production. HFCs do not deplete the ozone layer and are therefore not covered by the Montreal Protocol, but are greenhouse gases and covered by the UNFCCC.

These possible emission reductions would derive mainly from better containment in refrigeration and destruction of ozone-depleting substances present in existing applications (refrigerators and foams). Detailed scientific and technical assessments could provide policymakers with information necessary to fine-tune an accelerated HCFC phase-out to allow specific uses of HCFCs. Examples are use of HCFCs as feedstock for fluoropolymers and in other applications where emissions are near zero or where over-riding energy efficiency benefits are present. Thus, plausible scenarios that could achieve reductions in CO<sub>2</sub>-equivalent emissions of ozone-depleting substances and alternative gases both exist and have been considered. These reductions are considerable compared to the reduction target of the first commitment period of the Kyoto Protocol of about 2 GtCO<sub>2</sub>-eq/yr, but relatively small compared to the current global CO<sub>2</sub> emissions of about 30 GtCO<sub>2</sub>-eq/yr.

It is widely acknowledged that emission reductions exceeding those laid down for the first commitment period of the Kyoto Protocol will be needed to achieve the UNFCCC objective, namely, "stabilization of greenhouse gases concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". While emissions reductions under the Montreal Protocol have played an important role in the past, and future amendments can still have some additional benefits for climate, reductions of greenhouse gases not covered by the Montreal Protocol have a potentially much larger effect on the climate. ✓

In conclusion, I think the success of the Montreal Protocol is important, for it shows the effectiveness of an international agreement. ✓

1. WMO, Scientific assessment of ozone depletion: 2006, *World Meteorological Organization, Global ozone research and monitoring project, Report no. 50*, Geneva, 2007.

2. Velders, G.J.M., S.O. Andersen, J.S. Daniel, D.W. Fahey, M. McFarland, The importance of the Montreal Protocol in protecting climate, *Proceedings of the National Academy of Sciences*, 104, 4814-4819, 2007.

3. IPCC-TEAP, Safeguarding the ozone layer and the global climate system. Issues related to hydrofluorocarbons and perfluorocarbons, *Intergovernmental Panel on Climate Change*, Cambridge, UK, 2005.

Chairman WAXMAN. Thank you very much, Dr. Velders.  
Mr. Thornton, we would like to hear from you.

#### STATEMENT OF ALLAN THORNTON

Mr. THORNTON. Thank you, Mr. Chairman and distinguished members of the committee, for the opportunity to address you today, and thank you very much for having this very important hearing.

The Environmental Investigation Agency is a nonprofit organization. We investigate environmental crime all over the world, and we promote practical solutions to remedy such issues. We work with government enforcement agencies on all continents around the world to promote compliance with the Montreal Protocol and other international environmental agreements.

The Montreal Protocol is aptly regarded as the world's most successful environmental agreement, having phased out about 95 percent of ozone-depleting substances in developed countries, and around 50 to 75 percent in developing countries.

Because many ozone-depleting chemicals are also potent greenhouse gases, the Montreal Protocol's successful phase-out of CFCs and other ozone-depleting substances has also made it the world's most effective climate treaty. While it is true that the phase-out of CFCs has spared the atmosphere some billions of tons of greenhouse emissions, it also contains a cautionary tale of the consequences of not actively considering the impacts, particularly on the climate, of actions taken under the Ozone Layer Treaty.

In the early 1990's, HCFCs became the first generation of substitute chemicals for ozone-layer-destroying CFCs. It was recognized by the protocol that these chemicals had value as transitional substances to facilitate the prompt phase-out of CFCs; however, the exponential growth in the demand for refrigerant gases worldwide resulted in unchecked and extremely excessive production of HCFCs. HCFCs contribute significantly to global warming, and the Montreal Protocol has, thus, inadvertently created a new additional significant source of greenhouse gases.

The phase-out of HCFCs in developing countries is not due until 2040, and no caps will be required until 2015. With countries such as China and India set to potentially produce millions of tons of HCFCs over the next 10 to 20 years, and with the currently agreed Montreal Protocol phase-out decades off, this unhindered growth in HCFC production will severely undermine the international community's efforts to address climate change.

The good news is that, by accelerating the phase-out schedule for HCFCs under the Montreal Protocol, the international community has a huge opportunity to make a significant contribution to the global effort to mitigate climate change.

An unprecedented nine parties to the Montreal Protocol, including the United States, have recognized this opportunity and recently submitted proposals to accelerate the HCFC phase-out. These proposals will be considered at the next meeting of the parties of the Montreal Protocol in September.

As the United States considers these proposals, we would like to take the opportunity to highlight what EIA feels are key elements

of what any final decision should look like on accelerated HCFC phase-out.

First, any decision must include an earlier freeze date for the production of HCFCs. Many proposals are suggesting a freeze of 2010, but an earlier freeze date, such as 2007, would prevent additional excessive production of HCFCs by cutting off this very rapid growth in the production of these chemicals.

Second, proposals should contain additional reduction steps to lower the production and consumption of HCFCs. These additional reduction steps are important because they offer greater climate and ozone layer benefits and would provide measurable benchmarks and compliance targets.

Third, proposals must contain the commitment for funding. A fully funded phase-out of HCFCs ensures continuity of resources for the protocol's multilateral fund, allowing the fund to complete its important and highly cost effective work in protecting the ozone layer and the global climate.

Fourth, proposals must ensure the widespread adoption of climate-friendly replacement for HCFCs. While ozone-layer-friendly substitutes exist for virtually all current uses of HCFCs, many of these gases are just as bad, if not worse, in terms of climate impact. Thus, in order to realize the full climate benefits offered by an accelerated phase-out, any decision to adjust the phase-out schedule must include provisions that favor the adoption of climate-friendly alternatives to HCFCs.

Finally, concerted action to improve cooperation between the ozone layer and climate treaties is vital to the continued success of an accelerated phase-out of HCFCs. Specifically, parties to those two treaties must act urgently to address the perverse incentive that exists for the production of HCFC-22, which has been created through the Kyoto Protocol's clean development mechanism.

Now, HFCs, an even more potent greenhouse gases, are produced as a byproduct in the manufacture of HCFCs, and the HFCs are falling under the clean development mechanism of the Kyoto Protocol. Currently, the clean development mechanism is committing billions of dollars to capture and destroy the HFCs as they are produced as byproducts to HCFCs, even though there is no cap or commitment to cap HCFC production by the major producers, such as China and India.

While concerted international action to address the emissions of carbon dioxide is essential, we would be remiss, negligent even, not to seize upon all available opportunities to reduce the emission of greenhouse gases. The Montreal Protocol has a proven track record of success. With appropriate policy adjustments now, this landmark agreement has the potential to further deliver critical and cost effective climate protection in the near term.

On behalf of the Environmental Investigation Agency, I urge the U.S. Government to immediately and aggressively pursue an adjustment to the Montreal Protocol that includes measures to support the adoption of climate friendly alternatives to HCFCs in order to seize upon this historic opportunity to further mitigate climate change.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Thornton follows:]

**MAXIMIZING THE CLIMATE BENEFITS OF ACTIONS  
TAKEN UNDER THE MONTREAL PROTOCOL ON  
SUBSTANCES THAT DEplete THE OZONE LAYER**

**Testimony of Allan Thornton**  
**President, Environmental Investigation Agency**  
**with support from the Institute for Governance & Sustainable Development**

**US House of Representatives**  
**Committee on Oversight and Government Reform**  
**May 23, 2007**

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Mr. Chairman and Distinguished Members of the Committee on Oversight and Government Reform:

I would like to thank Chairman Waxman for the opportunity to address the committee today about the unprecedented climate benefits that can be realized through policy actions taken under international treaty to protect the ozone layer—the Montreal Protocol.

My organization, the Environmental Investigation Agency (EIA), is a nonprofit, non-governmental organization that investigates and exposes environmental crimes and promotes practical solutions to remedy such issues. Our work is focused on the illegal trade in ozone-depleting substances, illegal logging, and the illegal trade in wildlife.

Since the mid 1990s, EIA has instigated a series of successful actions to strengthen the Montreal Protocol, including exposing illegal trade in CFCs and halons, and generating major measures against this illicit trade. EIA instigated a European Union-wide ban on the sale of these two chemicals, eliminating a massive enforcement loophole in the existing law. EIA has provided details of illegal traders of these chemicals to governments around the world. EIA has provided the U.S. Department of Justice with evidence on many of the companies and individuals targeted in its high ranking customs alerts on illegal imports of CFCs. Recently, EIA exposed illegal CFC trade from China, generating a direct commitment from the Chinese government delegation to the Montreal Protocol to act quickly to curb that activity.

In recognition of these achievements, in June 2006, the U.S. EPA and a cross-sector, international panel awarded EIA the “2006 Stratospheric Ozone Protection Award,” – noting that “EIA is remarkably brave and successful in exposing illegal trade and in motivating policy makers to take action.”

**The World’s Most Successful Environmental Agreement**

The Montreal Protocol is widely, and aptly, regarded as the world’s most successful environmental agreement—having phased out 95 percent of ozone-depleting substances (“ODSs”) in developed countries and 50-75 percent of ODSs in developing countries—placing the ozone layer on a path to recover later this century.<sup>1</sup>

Because many ODSs are also potent greenhouse gases (“GHGs”) that contribute to climate change,<sup>2</sup> the Montreal Protocol’s successful phase-out of CFCs and other ozone-depleting substances (ODS) has also made it the world’s most effective climate treaty—reducing greenhouse gas emissions by approximately 11 gigatons of carbon dioxide equivalence per year between 1990 and 2010, thereby delaying the onset of climate change by up to 12 years.<sup>3</sup>

The Montreal Protocol’s success is based on its strict, flexible, and dynamic design, which has driven continuous technology innovations; its evolution through amendments, adjustments and decisions to reflect the most up-to-date scientific and technological developments; the commitment by developed countries to provide financial assistance to developing countries to ensure its successful implementation; and its attention to compliance from the outset.<sup>4</sup>

### **Mission Not Yet Accomplished**

Despite the Montreal Protocol’s success, and perhaps partly as a result of it, there is a public misconception that the problem of ozone depletion has been “solved.”

This, unfortunately, could not be further from the truth. Earth’s ozone layer is currently in its most fragile state in recorded history, leaving the people and ecosystems exposed to unprecedented levels of harmful ultraviolet radiation. The hole in the ozone layer over the Antarctic has reappeared each austral spring since its initial discovery, and has generally grown larger and lasted longer each year. The 2005 ozone hole was one of the deepest and largest ever recorded, nearly equaling the all-time record set in 2000.<sup>5</sup>

While significant progress has been made to reduce the atmospheric concentration of ozone layer destroying chemicals, there is no definitive evidence demonstrating that the ozone layer has started to recover. The most recent prediction by NASA delays recovery until 2068, nearly 20 years later than previous estimates.<sup>6</sup> These predictions do not take into account illegal trade nor the challenge of compliance,<sup>7</sup> especially in developing countries where the 2010 ban on chlorofluorocarbons (“CFCs”) is quickly approaching.<sup>8</sup> Without full compliance, the recovery will be delayed further.

The continuing impact of ODSs on the ozone layer, and the significant contribution the ODSs and some of their substitutes are making to climate change, demonstrate that the Parties’ commitment to protect the ozone layer has not yet been fulfilled, and that significant challenges remain.<sup>9</sup> These challenges to the future success of the Montreal Protocol come at a time when the impacts of climate change are becoming increasingly apparent.<sup>10</sup>

In 2002, a 3,350 square kilometer floating ice shelf in Antarctica, that has existed since the last Ice Age 12,000 years ago, collapsed due to record temperatures.<sup>11</sup> The number of Category 4 and 5 hurricanes has doubled in the last 35 years,<sup>12</sup> and the flow of ice from glaciers in Greenland has more than doubled over the past decade.<sup>13</sup> Last year, a report commissioned by the US Congress confirmed what the world’s leading scientists have known for years: the Earth was warmer in the late 20th Century than it had been in the last 400 or possibly 1,000 years, humans are largely responsible for this change—and it is only getting hotter.<sup>14</sup>

### **The Urgent Need for Action**

While it is true that the phase-out of CFCs has spared the atmosphere of billions of tons of carbon dioxide equivalent emissions, it also contains a cautionary tale of the consequences of not actively considering the impacts, particularly on the climate, of actions taken under the Montreal Protocol.

In the early 1990s, HCFCs became the first generation of substitute chemicals for CFCs and were added to the list of substances controlled by the Montreal Protocol. It was recognized by the Protocol that these chemicals were not the solution to the problem of ozone layer destruction, but had value as “transitional substances” to facilitate prompt phase out of CFCs. However, exponential growth in the demand for refrigerant gases worldwide has resulted in unchecked and excessive production of HCFCs.<sup>15</sup> As many HCFCs, notably HCFC-22, contribute significantly to global warming (HCFC-22 is 1,700 more effective at warming the planet than carbon dioxide), the Montreal Protocol has inadvertently created a significant source of greenhouse gases.<sup>16</sup>

With countries such as China and India set to produce millions of metric tons of HCFCs over the next 10-20 years and with the currently agreed Montreal Protocol phase out decades off, the unhindered and exponential growth in HCFCs will severely undermine the international community's efforts to address climate change. ✓

In addition, the excessive production of one particular HCFC, HCFC-22, is causing major problems for the international carbon market. A byproduct of the production of HCFC-22 is HFC-23—a greenhouse gas regulated by the Kyoto protocol because of its high global warming potential. HFC-23 is over 11,000 times more powerful than carbon dioxide at warming the planet. To date, the Parties to the Kyoto Protocol have spent billions of dollars to destroy HFC-23 under the Kyoto Protocol's Clean Development Mechanism. The result is that the carbon credits from these projects have dominated the global carbon market at the expense of renewable energy projects. I will touch more on this later.

#### **Opportunity Knocking**

The good news is that by adjusting the phase-out schedule for HCFCs under the Montreal Protocol to accelerate the elimination of HCFCs, the international community has the opportunity to make a significant contribution to the global effort to mitigate climate change.<sup>17</sup> ✓

In fact, experts report that strengthening protection of the ozone layer could reduce emissions by approximately 1.2 gigatons of carbon equivalence per year by 2015. This compares favorably to the 1 gigatons carbon equivalence per year in emissions reductions mandated by the Kyoto Protocol by 2012<sup>18</sup> and the 2 gigatons carbon equivalence per year emissions reduction expected under Kyoto by 2012.<sup>19</sup> It can be argued that the Montreal Protocol has done more to mitigate climate change than the Kyoto Protocol and if an accelerated phase-out is agreed, it could continue to be the most effective climate treaty in the near-term.

Under the current phase-out schedule, HCFCs are set to be phased out in developed countries by 2030, and by 2040 in developing countries. However, having recognized the tremendous potential benefits to both the ozone layer and the climate, the Montreal Protocol Parties are considering speeding up the phase out of these chemicals.

Indeed, an unprecedented nine Parties,<sup>20</sup> the United States we are pleased to note, have proposed accelerating the HCFC phase-out to avoid the extremely high projected increase in HCFC production over the next decade. Many of these proposals came from developing nations which are most vulnerable to the impacts of a changing climate, including a joint proposal from Argentina and Brazil, as well as from small island nations, such as Mauritius, Palau and the Federated States of Micronesia.

Their concern is understandable. NASA scientist James Hansen warns that we may have as few as ten years left before positive feedbacks in the climate system could accelerate global warming and push the climate system across the threshold for non-linear change that would create “a different planet,” with an ice-free Arctic and coastlines obliterated by rising sea levels.<sup>21</sup> Abrupt non-linear changes to the climate, also known as Rapid Climate Change Events, include the melting of the Greenland ice sheet. A complete melting of the Greenland ice sheet would raise sea levels by 6.5 meters.<sup>22</sup>

In their submissions, most of the Parties have noted the significant climate benefits of an accelerated phase out of HCFCs. Several other noted that the greenhouse gas reductions achievable under the Montreal Protocol could offer critical low-cost insurance against abrupt changes to the climate, effectively buying the world more time to get the post-Kyoto regime in place and the global carbon market running effectively.

### **Maximizing the Potential Climate Benefits of the Montreal Protocol**

In order to achieve the benefits of an accelerated HCFC phase-out, it is critically important that any decision to adjust the phase out contain the following elements:

✓ **(1) An Earlier Freeze Date:**

An earlier freeze, such as 2006 or 2007, prevents additional excessive production of HCFCs and it also: (a) prevents over-reliance on HCFC-based technology in developing world markets, (b) reduces the incentive to increase HCFC-22 production in order to receive Kyoto Protocol Clean Development Mechanism (CDM) credits, particularly at new facilities, (c) levels the playing field for alternatives, (d) provides justification for full replenishment of the Montreal Protocol's funding mechanism - the Multilateral Fund, (e) mitigates issues of noncompliance, and (f) offers the greatest climate and ozone layer benefits by reducing the total production of HCFC-22 and its HFC-23 byproduct.

✓ **(2) Additional reduction steps:**

Additional reduction steps are important because they: (a) offer greater climate and ozone layer benefits, (b) provide measurable benchmarks and compliance targets to guide and justify funding, (c) further level the playing field for alternatives, (d) make reduction targets more achievable thereby ensuring higher compliance rates, and (e) cause fewer disruptions in the market.

A phase-out that includes both an earlier freeze date and additional reduction steps will help developing countries avoid compliance problems in the future. Experts at funding institutions, who have worked closely with developing countries on Montreal Protocol implementation, have expressed serious concerns about the compliance implications of the HCFC phase-out as it currently stands. They suggest that current and planned production capacity will make it very difficult for some developing countries to meet the 2015 freeze. An advanced draft report by UNDP on their HCFC surveys states that “it is easy to imagine how difficult it will be for article 5(1) countries to freeze and continue at that level [e.g. 2015 levels] if no action to constrain this scenario is taken well before 2015.”<sup>23</sup>

In addition, the “brick wall” approach in the current phase-out plan risks triggering considerable illegal trade problems in HCFCs, similar to those problems experienced by the U.S. Government in

the mid-1990s in regard to CFCs. There are already some indications that HCFCs are being imported illegally into the US.<sup>24</sup>

✓ **(3) Commitment for funding:**

An accelerated HCFC phase-out must be accompanied by funding commitments from developed countries. The 2009-2011 Multilateral Fund replenishment process will begin at the next Meeting of the Parties to the Montreal Protocol in September 2007, where the Terms of Reference for the study of the replenishment will be decided. It is essential that the Terms of Reference take into account the provision of funds for an accelerated phase-out of HCFCs.

A fully-funded phase-out of HCFCs ensures continuity of resources for the Multilateral Fund, allowing the Fund to complete its important and cost-effective work in protecting the ozone layer and the global climate. Without further phase-out commitments, there is a risk that the Multilateral Fund will not be fully replenished during the next funding cycle. This raises the concern that obtaining funding in later years, when existing phase-out commitments kick in, will be problematic. This could cause serious issues for developing countries as they attempt to comply with the phase-out schedule.

✓ **(4) Ensure the Widespread Adoption of Climate-Friendly Replacements for HCFCs:**

Critically, any decision on an accelerated phase-out *must* provide the right measures to ensure that climate-friendly alternatives to HCFCs are adopted. While ozone layer-friendly substitutes exist for virtually all current uses of HCFCs, many of these gases are just as bad, if not worse, for the climate. Thus, in order to realize the above-mentioned climate benefits, any decision to adjust the phase-out schedule *MUST* include provisions that favor the adoption of environmentally-superior, and specifically, climate-friendly, alternatives to HCFCs.

Unfortunately, there has been reluctance on the part of some Parties. It seems they would prefer to keep ozone layer and climate change in their own separate boxes. This is, frankly, bad policy. Ozone layer depletion and climate change occur as a double assault on one atmosphere. Furthermore, many of the same gases contribute to both issues. These problems are, thus, inextricably linked and must be addressed in tandem. It would be an unforgivable mistake if, for jurisdictional or political reasons, the climate impacts of policies adopted under the ozone layer treaty were ignored.

Any Montreal Protocol adjustment decision must explicitly address both the ozone *and* the climate impacts, of ODS substitutes. As Parties develop programs to phase out HCFCs, they must incorporate climate considerations from the start. Failure to do so will result in a repeat of past mistakes and waste resources, as we yet again replace one problem with another. Specifically, the Multilateral Fund must be given express direction by the Parties to consider climate impacts in their support of replacements for HCFCs.

This can be accomplished by adopting principles within the text of the treaty that explicitly focusing on climate benefits in addition to ozone benefits, assessing the cumulative environmental impacts of ODS substitutes, by favoring the least harmful ODS substitutes, and promoting further technological innovations, including redesign of equipment, processes, substitutes, and products, as well as not-in-kind alternatives. It could also include the consideration of temporary exemptions to the HCFC phase-out for gases with superior climate benefits than the currently available non-HCFC alternatives—until superior alternatives emerge.

Replacing HCFCs with high-GWP HFC substitutes will undermine the Montreal Protocol's ability to deliver significant climate benefits. Low GWP substitutes, including "natural refrigerants" such as ammonia, hydrocarbons and, ironically, carbon dioxide are readily available. In addition, we know that chemical companies are fast at work researching other ozone- and climate-friendly chemical alternatives to HCFCs. For example, after the use of HCFCs and high GWP HFC alternatives were banned in Europe in automobile air conditioning systems, chemical companies quickly capitalized on the clear regulatory signal and introduced a low GWP alternative that is both technically and economically feasible.

Currently however, market penetration of alternatives is hampered by the relaxed phase-out schedule for HCFCs. Due to its artificially cheap price, HCFC-22, and the equipment designed to use it, dominate the global refrigeration and air conditioning market. The current phase-out schedule would not start limiting HCFC production in developing countries for nine more years – well after many countries have become "hooked" on this gas and the technology to support it. With appropriate regulatory signals, companies will have the incentive to introduce new low GWP substitutes that are comparable to HFCs in terms of technical and economic feasibility.

The United States, in particular, can assist in these efforts by re-evaluating its criteria for the importation of hydrocarbon-based small window air conditioning units and domestic refrigerators and any other restrictions that could prevent the safe use of this ozone- and climate-friendly technology.

If climate friendly alternatives, which are in a critical period of development, are effectively supported during the implementation of the HCFC phase-out, the climate benefits rivaling those of the Kyoto Protocol referred to earlier can be achieved.

#### ✓ (5) Effective cooperation with the Kyoto Protocol

Finally, concerted action to improve cooperation between the ozone layer and climate treaties is vital to the continued success of the Montreal Protocol our potential to maximize its climate benefits.

In addition to improving overall communications and coordination, Parties to these two treaties must act urgently to address the "perverse incentive" for the production of HCFC-22 which has been created through the Kyoto Protocol's Clean Development Mechanism.

As I noted earlier, HFC-23 is a potent global warming gas that is produced as a byproduct during the manufacture of HCFC-22. Along with all other HFCs, HFC-23 is regulated by the Kyoto Protocol for its significant global warming impact—it is over 11,000 times more effective than carbon dioxide in warming the planet.

Under Kyoto's Clean Development Mechanism, developing countries can earn Certified Emission Reduction Credits (CERs) for the capture and destruction of HFC-23, which can be sold on the global carbon market. Because of the low cost of the destruction technology and the high price of carbon credits, these HFC-23 destruction projects generate extraordinary profits for HCFC-22 producers. It is estimated that the cost of capturing and destroying all eligible HFC-23 emissions through 2012 is about \$135 million, but the value of the HFC-23 CERs on the carbon market through 2012 is about \$6.4 billion.<sup>25</sup>

This has generated windfall profits for HCFC-22 producers and has created an incentive for increasing the production of HCFC-22 in order to earn more credits, thereby subsidizing a potent global warming and ozone depleting gas.

In addition to undermining the work of the Montreal Protocol to phase out HCFCs, the HFC-23 destruction projects have dominated CDM, accounting for 52 percent of all project-based carbon volumes transacted in 2006 and 64 percent in 2005<sup>26</sup> and are squeezing out the less profitable (but far more important) CDM projects promoting renewable energy and greater energy efficiency.

They also compromise the credibility of the Clean Development Mechanism and the global carbon market by introducing questionable credits. Indeed, by our estimate, for every GWP ton of HFC-23 destroyed through these CDM projects, about 5 GWP tons of HCFC-22 eventually will be emitted into the atmosphere.

The Parties to the Montreal Protocol and the Kyoto Protocol must work together, on an urgent basis, to remedy this problem.

### Conclusion

Mr. Chairman and Distinguished Members of the Committee, last December, journalists reported that rising seas, caused by global warming, have for the first time washed an inhabited island off the face of the Earth. The obliteration of Lohachara island, in India's part of the Sundarbans, marked the moment when one of the most apocalyptic predictions of environmentalists and climate scientists started coming true.<sup>27</sup>

While concerted international action to address the emission of carbon dioxide is essential, we would be remiss, negligent even, not to seize upon all available opportunities to reduce the emission of greenhouse gases. With the Montreal Protocol, there is a proven track record of success. Through this agreement, the international community has phased out global production of 95% of ozone-depleting substances in less than 20 years—sparing the atmosphere billions of tons of carbon dioxide equivalence per year and delaying the onset of climate change by as much as 12 years. With critical policy adjustments now, notably an agreement to accelerate the phase out of HCFCs and the promotion of climate friendly alternatives in their place, this landmark agreement has the potential to deliver further critical and cost-effective climate protection.

On behalf of the Environmental Investigation Agency, I urge the U.S. government to immediately and aggressively pursue an adjustment to the Montreal protocol that includes measures to support the adoption of climate friendly alternatives to HCFCs in order to seize a historic opportunity to mitigate climate change. In the longer term, the U.S. should consider legislative and regulatory measures to promote climate friendly air-conditioning and refrigeration technologies to make the U.S. market a leader in this global effort.

Thank you.

<sup>1</sup> World Meteorological Organization & U.N. Environmental Programme, Science Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer, *Scientific Assessment of Ozone Depletion: 2006, Executive Summary*, at 3 (Aug. 18, 2006), available at [http://www.wmo.ch/web/arep/ozone\\_2006/exec\\_sum\\_18aug.pdf](http://www.wmo.ch/web/arep/ozone_2006/exec_sum_18aug.pdf) (last visited Feb. 3, 2007) [hereinafter "Science Assessment of Ozone Depletion: 2006"]. See also Press Release, United Nations Environment Programme, Programme, New Report Projects Later Recovery of Ozone Layer (Aug. 18, 2006), available at <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=484&ArticleID=5335&l=en> (last visited Feb. 3, 2007).

<sup>2</sup> U.N. Environmental Programme, Intergovernmental Panel on Climate Change, Technology and Economic Assessment Panel, *Special Report: Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons*, at 3-4 (2005) [hereinafter "IPCC/TEAP Special Report"].

<sup>3</sup> Guus J. M. Velders, et. al., *The importance of the Montreal Protocol in protecting climate*, 104 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 4814 (2007).

<sup>4</sup> RICHARD BENEDICK, OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET (Harvard University Press 1991). See also STEPHEN O. ANDERSEN & K. MADHAVA SARMA, PROTECTING THE OZONE LAYER: THE UNITED NATIONS HISTORY (Earthscan Publications Ltd. 2002); Hunter, Salzman, and Zaelke, INTERNATIONAL ENVIRONMENTAL LAW & POLICY, Ch. 9 (Foundation Press, 3<sup>rd</sup> ed. 2007).

<sup>5</sup> British Antarctic Survey Ozone Bulletin. December 2005. See also: NASA Science News. *Record Setting Ozone Hole*. September 2000.

<sup>6</sup> NASA, NOAA and NCAR Press Release: *Scientists Find Antarctic Ozone Hole to Recover Later than Expected*. June 29, 2006.

<sup>7</sup> World Meteorological Organization & U.N. Environmental Programme, Science Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer, *Scientific Assessment of Ozone Depletion: 2006, Executive Summary*, at 3 (Aug. 18, 2006), available at [http://www.wmo.ch/web/arep/ozone\\_2006/exec\\_sum\\_18aug.pdf](http://www.wmo.ch/web/arep/ozone_2006/exec_sum_18aug.pdf) (last visited Feb. 3, 2007) [hereinafter "Science Assessment of Ozone Depletion: 2006"]. See also Press Release, U.N. Environment Programme, New Report Projects Later Recovery of Ozone Layer (Aug. 18, 2006), available at <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=484&ArticleID=5335&l=en> (last visited Feb. 3, 2007).

<sup>8</sup> Environmental Investigation Agency, *An Unwelcome Encore: The Illegal Trade in HCFCs*. October 2006. Noting that illegal trade in ODS began to grow after the 1999 freeze date for CFCs in developing countries.

<sup>9</sup> Science Assessment of Ozone Depletion: 2006, (noting that ozone depletion and climate change are further interrelated, with climate change likely obscuring or harming the recovery of the ozone layer.)

<sup>10</sup> See Intergovernmental Panel on Climate Change, *Climate Change 2007: The Physical Science Basis Summary For Policy Makers*, 10 (2007) ("most of the observed increase in globally averaged temperatures since the mid-20<sup>th</sup> century is very likely due to the observed increase in anthropogenic increase in greenhouse gas concentrations. This is an advance since the TAR's conclusion that 'most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations'."). See also *id.* at n.6 (explaining that "Very likely > 90%, Likely > 66%" in terms of the probability of occurrence).

<sup>11</sup> NASA Earth Observatory. *New Images: Breakup of Larsen Ice Shelf, Antarctica*. March 2002.

<sup>12</sup> National Science Foundation press release: *Number of Category 4 and 5 Hurricanes Has Doubled Over the past 35 Years*. September, 15, 2005.

<sup>13</sup> NASA Jet Propulsion Lab news release: *Greenland Ice Loss Doubles in Past Decade, Raising Sea Levels Faster*. February 16, 2006.

<sup>14</sup> Associated Press. *Study: Earth "likely" hottest in 2,000 years*. June 22, 2006.

<sup>15</sup> Experts have indicated that HCFC production could exceed 800,000 tons by 2010—far above the 1998 projection of 163,000 tons by 2015. See report and presentations from the February 2007 meeting of the "Stockholm Group" in The Hague.

<sup>16</sup> Climate Change 1995, the Science of Climate Change: *Summary for Policymakers and Technical Summary of the Working Group I Report*. Page 26.

<sup>17</sup> See Donald Kaniaru, Raj Shende, Scott Stone & Durwood Zaelke, *Strengthening the Montreal Protocol: Insurance Against Abrupt Climate Change*, 7 SUSTAINABLE DEVELOPMENT LAW & POLICY 3 (2007). See also Guus J. M. Velders, et. al., *The importance of the Montreal Protocol in protecting climate*, 104 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 4814 (2007).

<sup>18</sup> UNFCCC, *Key GHG Data: Highlights from Greenhouse Gas Emissions Data for 1990-2003* (Nov. 2005). Kyoto's actual emissions reductions will be closer to 2 GtCO<sub>2</sub>-eq. yr<sup>-1</sup> by 2012 if avoided emissions from business-as-usual projections over that timeframe are considered.

<sup>19</sup> *Id.*

<sup>20</sup> Proposals were submitted by: Argentina and Brazil together; Mauritius; Mauritania; Switzerland, Norway and Iceland together; The Federated States of Micronesia; and Palau.

<sup>21</sup> Steve Connor, *If we fail to act, we will end up with a different planet*, THE INDEPENDENT, Jan. 1, 2007. See also James Hansen, *A Slippery Slope: How Much Global Warming Constitutes 'Dangerous Anthropogenic Interference'?* 68 CLIMATE CHANGE 269 (2005).

<sup>22</sup> U.S. Geological Survey, "Sea Level and Climate," at <http://pubs.usgs.gov/fs/fs2-00/> (last visited Feb 3, 2007).

<sup>23</sup> See report and presentations from the meeting of the "Stockholm Group" in The Hague in February 2007.

<sup>24</sup> Environmental Investigation Agency, *An Unwelcome Encore: The Illegal Trade in HCFCs*, October 2006.

<sup>25</sup> Michael Wara, *Is the Global Carbon Market Working?* NATURE, VOL. 445, February 8, 2007, 595-96 (discussing that cost to the developed world for installing technology to capture and destroy HFC-23 at the 17 production facilities in the developing world would be €100 million, compared to €4.7 billion in value for CERs generated under CDM through 2012, based on €10/ton price of carbon at time of author's calculations, and neglecting taxes).

<sup>26</sup> International Emissions Trading Association & World Bank, *State and Trends of the Global Carbon Market 2006 (Update: January 1 – September 30, 2006)*, at 11 (Oct. 2006)

<sup>27</sup> Disappearing world: Global warming claims tropical island . Environment Editor Geoffrey Lean reports. 24 December 2006.

Chairman WAXMAN. Thank you very much, Mr. Thornton.  
Dr. McFarland.

#### STATEMENT OF MACK MCFARLAND

Mr. MCFARLAND. Good morning, Chairman Waxman, Mr. Davis, and members of the committee. My name is Mack McFarland, and I am the global environmental manager for DuPont's Fluorochemical Business. I appreciate this opportunity to speak with you regarding stratospheric ozone and climate protection. In my testimony I will discuss DuPont's experiences, our views of the effectiveness of the Montreal Protocol, and suggest ways in which the protocol can be enhanced, and, as focus shifts specifically to climate protection, how national implementation can be improved.

DuPont is a science-driven company with a commitment to safety, health, and environmental protection. We strive for sustainable growth that benefits our shareholders, the societies in which we operate, and the global environment. It was our vision of sustainable growth that led us to set aggressive, voluntary goals and reduce our global greenhouse gas emissions. It is also this vision that led us to co-found the U.S. Climate Action Partnership and call for U.S. leadership on reducing greenhouse gases emissions.

We believe that with a properly designed, mandatory program the power of the market can be harnessed to achieve environmentally effective and economically sustainable greenhouse gas emission reductions.

DuPont introduced the first fluorochemical refrigerant gases, chlorofluorocarbons [CFCs], in the 1930's, as safer alternatives to the more dangerous refrigerants then in use, such as ammonia. In 1988, based on the emerging scientific consensus, we voluntarily committed to phaseout CFCs. We also used our science capabilities to lead in the development of alternative products to meet the growing societal need for air conditioning and refrigeration. This experience with CFC ozone issue provided us with a keen understanding of the implication of environmental issues that are global in scope and decades to centuries in duration.

The Montreal Protocol is widely recognized as a model for addressing global environmental issues. Progress has been rapid. The actions under the protocol have led to significant reductions in the current and future risks of both ozone depletion and climate change, while allowing the market to bring forward safe, efficient, and cost-effective substitutes with lower or no ozone-depleting potential.

We would like to recognize the tremendous leadership that both the Department of State and the Environmental Protection Agency have shown in developing, implementing, and improving the protocol.

We have continued to provide a broad range of non-ozone-depleting fluorochemicals to meet market needs. In February 2006 we announced that we had identified low-global-warming-potential, non-ozone-depleting alternatives for automotive air conditioning, with leading candidates that have global warming potentials only about 3 percent that of current products. It is our intent to apply these non-ozone-depleting, low-global-warming-potential technologies to other applications, as well.

While the Montreal Protocol has been a clear success, we believe it can be improved. At the international level, we believe the phase-out schedule for HCFCs should be accelerated in developing countries, as the U.S. Government has proposed. We also believe that the United States and other developed countries can and should accelerate their phase-out schedule.

At the National level, we believe implementation can be enhanced through more reliance on market-based mechanism.

Looking forward to regimes for climate protection, we suggest two potential market-based regulatory approaches for improving stewardship of HFCs.

Congress could establish a cap based on carbon equivalency, specifically on HFCs placed on the market, as was done on ozone-depleting equivalency for CFCs, halons, and HCFCs. This could be combined with appropriate market-based incentives for capture and destruction of the material at the end of its useful life.

Alternative, HFCs could be included in a broader cap on greenhouse gas emissions. In this case, carbon-equivalent allowances would be required to be surrendered to place these compounds on the market, and carbon-equivalent credits would be granted for their destruction, creating market incentives for improved stewardship.

In summary, the Montreal Protocol has been an unprecedented success, protecting both stratospheric ozone and the global climate system. That success could be enhanced through an acceleration of the current HCFC phase-out schedule in both developed and developing countries.

Domestically, increased use of market-based systems for the fluorochemical gases under any climate change legislation could create cost-effective market incentives for more effective stewardship.

Thank you for the opportunity to share our thoughts on this important subject with the committee. I look forward to your questions.

[The prepared statement of Mr. McFarland follows:]

**Statement of Mack McFarland, Ph.D.  
Global Environmental Manager  
DuPont Fluoroproducts  
E.I. DuPont de Nemours and Company, Inc  
before the  
Committee on Oversight and Government Reform  
U.S. House of Representatives  
May 23, 2007**

Good morning Chairman Waxman, Mr. Davis, and members of the committee. My name is Mack McFarland, and I am the Global Environmental Manager for DuPont's fluorochemicals business. In that role I advise our worldwide operations on a range of environmental and business matters. Prior to joining DuPont in 1983 I was an atmospheric scientist with the National Oceanic and Atmospheric Administration studying processes that control atmospheric ozone. While employed by DuPont I was on loan to the United Nations Environment Programme for two years and to a Technical Support Unit of the Intergovernmental Panel on Climate Change (IPCC) for one year. During this time I worked at the science/policy interface on the issues of ozone depletion and global climate change. I appreciate this opportunity to share our experiences regarding stratospheric ozone protection and the positive impact the management of ozone depleting substances has and can have on climate protection. In my testimony I will discuss DuPont's experiences, our views of the effectiveness of the Montreal Protocol and suggest ways in which the Protocol can be enhanced and, as focus shifts specifically to climate protection, national implementation can be improved.

DuPont is a science driven company with a commitment to safety, health and environmental protection. We use science to derive products and services that improve the quality and safety of people's lives. We also use science to drive how we develop, manufacture and manage our products throughout their life cycle. As a 200 year old company we take the long view, and strive for sustainable growth that benefits our shareholders, the societies in which we operate and the global environment. It is that commitment to sustainable growth and dedication to science that underpins our approach to protection of stratospheric ozone and the climate.

It was our vision of Sustainable Growth that led us to set goals and reduce our global greenhouse gas emissions 72% between 1990 and 2004, and set additional goals for another 15% reduction by 2015. It is also this vision that led us to co-found the US Climate Action Partnership (USCAP) and call for US leadership on reducing greenhouse gas emissions. The members of the USCAP believe that with a properly designed mandatory program we can harness the power of the market to achieve environmentally effective and economically sustainable greenhouse gas emissions reductions.

DuPont introduced the first fluorochemical refrigerant gases, chlorofluorocarbons, or CFCs, in the 1930s. They were developed as safer alternatives to the more dangerous refrigerants then in use, such as ammonia. In 1988, based on the scientific consensus presented in the International Ozone Trends Panel Report, and our evaluation of that science, we voluntarily and unilaterally committed to phase out CFCs; this was done over two years ahead of the London Amendment to the Montreal Protocol where countries adopted such a phase-out. We also used our science capabilities to lead in the development of alternative products to meet

the growing societal need for air conditioning and refrigeration. This experience with the CFC/ozone issue provided us with a keen understanding of the implications of environmental issues that are global in scope and decades to centuries in duration.

The Montreal Protocol, ratified by 191 countries, is widely recognized as a model for addressing global environmental issues. Progress was rapid under the Protocol. It took a mere four-and-one-half years to phase out developed world consumption of halon fire extinguishants and six-and-one-half years for CFCs, the two classes of compounds with the highest ozone depleting potentials. To avoid unwarranted market disruptions the Protocol provides minor uses under "essential use" exemptions. The developing world phase-out date of 1 January 2010 for these classes of compounds is rapidly approaching. The phase-out of the lower ozone depleting CFC replacements, the hydrochlorofluorocarbons (HCFCs), is already underway in developed countries. Other ozone depleting compounds such as methyl chloroform, carbon tetrachloride and methyl bromide also have been addressed under the Montreal Protocol. The actions under the Protocol have led to significant reductions in the current and future risk of both ozone depletion and climate change while allowing the market to bring forward safe, efficient, cost effective substitutes with lower or no ozone depleting potential. We would like to recognize the tremendous leadership that both the Department of State and EPA have shown in developing, implementing and improving the Protocol. ✓

This extraordinary success is the result of unprecedented cooperation among stakeholders, scientists, regulators, environmental groups and industry. This cooperation resulted in a regulatory framework that accounted for the global dimensions of the issue, was environmentally effective, and provided the flexibility for industry to develop cost effective solutions that continued to meet societal needs. At the international level, clear, prioritized targets were set for the phase-out of ozone depleting compounds, addressing those classes of compounds with the highest potential to deplete ozone first. Phase-outs for developing countries lagged those in developed countries to allow new, more ozone friendly technologies to be developed and deployed in order to reduce economic burden and societal disruption. Assistance was also provided to developing countries through the Multilateral Fund of the Protocol. These efforts led to progressive generations of refrigerant gases, from the original CFCs, the second generation HCFCs, the third generation non-ozone depleting hydrofluorocarbon (HFC) products as well as non-fluorocarbon based technologies. Similarly, progressive generations of products have been developed and implemented for other applications including foaming agents for insulating panels, cleaning agents, and medical devices. Today DuPont and others are developing the next generation of high performance non-ozone depleting compounds with low global warming potentials (GWPs).

A key aspect of the Protocol was its allowance for individual governments to determine the form of regulations to best meet the phase-out targets under their circumstances. U.S. implementation of the Protocol under the Clean Air Act Amendments of 1990 has, for the most part, provided incentives for innovation and allowed the flexibility for companies to develop and deploy technologies to continue to meet consumer needs.

As the original inventor and, at that time, the largest supplier of fluorocarbons, DuPont played an active role in resolving the global environmental concerns posed by CFCs. We helped advance the environmental goals of the Protocol, seeking scientific understanding of the potential impact of the existing CFC technology, responding to the rapid advances in the science, and developing alternative products. In recognition of these accomplishments

DuPont was awarded the 2002 National Medal of Technology for "CFC Policy and Technology Leadership."

We have continued to provide a broad range of non-ozone depleting fluorochemicals to meet market needs. We produce a range of single component and blended products to facilitate safe, efficient and cost effective refrigeration, air conditioning, medical, insulation and other new products. Our Isceon® 9 series of products allows easy, cost effective retrofit of existing equipment that currently uses HCFC-22 and the remaining uses of CFCs. In February of 2006 we announced that we had identified low GWP, non-ozone depleting alternatives for HFC-134a used in mobile air conditioning. The leading candidates have GWPs on the order of only 3% that of HFC-134a and can meet the requirements of the European Union fluorinated gases directive that will phase out the use of HFC-134a in new car models beginning in 2011. It is our intent to leverage these non-ozone depleting, low GWP technologies to other applications that currently rely on higher GWP products, including other refrigerant applications and foam expansion agents for insulating materials. Our goal is to provide ever more environmentally sound products to the market. In fact, as part of our Sustainable Growth goals DuPont has pledged to double our research and development (R&D) investments in programs with direct, quantifiable environmental benefits for our customers and consumers by 2015, while growing our annual revenue from products that create energy efficiency and/or significant greenhouse gas emissions reductions for our customers by \$2 billion during the same period. Additionally, we estimate these products will contribute at least 40 million tonnes of additional CO<sub>2</sub> equivalent reductions annually by our customers and consumers. In essence we intend to do well for our shareholders and the environment simultaneously.

While the Montreal Protocol has been a clear success, we believe it can be improved. Several actions could enhance the effectiveness of the international agreement and its national implementation and provide additional protection of stratospheric ozone and climate.

At the international level, we believe the phase-out schedule for HCFCs should be accelerated. The U.S. played a leading role in the initial development and ongoing enhancement of the Protocol. It is continuing that leadership through its proposals to adjust the phase-out schedule for HCFCs in this, the twentieth anniversary year of the Montreal Protocol. The existing schedule has no controls on HCFC use in developing countries until 2015 and then their allowable consumption is frozen at the 2015 level until it suddenly drops to zero on 1 January 2040. Recent data and reports prepared by the Montreal Protocol Technical and Economic Assessment Panel suggest that this schedule is allowing very large growth and emissions of HCFCs in these countries. We believe a gradual ramp down in HCFC consumption in the developing world, rather than the current "full speed until you stop" approach, is both more manageable and environmentally effective by significantly reducing the net quantity of ozone depleting and climate warming compounds emitted into the atmosphere. With more environmentally sound alternatives already developed and deployed in both developed and developing countries, more can be done for protection of the ozone layer, as has been proposed by the U.S. Government. DuPont fully supports a significant acceleration of this phase-out of HCFCs in developing countries through a gradual ramp down and accelerated timetable. We also believe that the U.S. and other developed countries can and should accelerate their phase-out schedule.

When the Montreal Protocol was first agreed and implemented, the technologies to move away from ODSs were only beginning to be developed and deployed. Thus the Protocol provided for a delay in implementation in the developing world and for the Multilateral Fund to assist in their conversion away from ODSs. The situation is now much different. Alternatives to HCFCs are developed and deployed for virtually all applications. In fact, the alternative chemicals and goods are currently being produced in developing countries for both their use and for sale in developed countries. Furthermore, the major advances in energy efficient equipment are, for the most part, occurring for equipment that uses non-ozone depleting alternatives. Thus, more rapid transitioning away from HCFCs in developing countries should be far less costly than the transition away from CFCs and, in fact, could save money in some instances where there are significant energy efficiency advantages of non-ODS technologies. Deployment of more energy efficiency equipment will also reduce energy use, and, hence, carbon dioxide emissions, providing further climate protection. An earlier HCFC phase-out would also serve to limit the amount of equipment using HCFCs that is put on the market and, hence, limit future needs for HCFC refrigerants for equipment servicing.

An additional advantage of an acceleration of the HCFC phase-out is the avoidance of additional HCFC-22 production and use and the potential emission of an unintended manufacturing by-product, HFC-23, that has a quite high GWP of 11,700. Unless specific actions are taken, such as DuPont has, to capture and destroy the incidental HFC-23 that is created during HCFC-22 production, it is emitted to the atmosphere. Under the Kyoto Protocol, the Clean Development Mechanism (CDM) allows entities in regulated economies to finance greenhouse gas reducing projects in non-regulated economies and receive greenhouse gas reduction credits. CDM is a very positive aspect of the Kyoto Protocol, allowing capital to flow to the lowest cost greenhouse gas emissions available in the world economy in a market sensible manner.

Projects to destroy HFC-23 emissions from HCFC-22 plants in developing countries are allowed under the CDM for facilities that were in operation by 1 January 2001. DuPont fully supports these types of projects as meeting all the criteria of CDM and providing real climate benefits. However, China is requesting that CDM credits be granted for HFC-23 destruction projects at HCFC-22 facilities that have begun operation more recently. We are concerned that any such decision could unfortunately create incentives for HCFC-22 production beyond normal market demand and the construction of additional HCFC-22 production facilities. This could occur largely for the purpose of generating HFC-23 destruction credits, which have more market value than does the HCFC-22 product, rather than to satisfy HCFC-22 market demand. This would serve to impede the phase-out, with the HFC-23 CDM project becoming the product and HCFC-22 becoming the byproduct. An acceleration of the HCFC phase-out in developing countries under the Montreal Protocol would help to address this potential problem. Countries will also need to address this issue under the CDM process under the Kyoto Protocol in a manner that prevents such consequences. These actions under the two regimes would provide additional climate protection by avoiding unnecessary emissions of greenhouse gases.

To ensure that the HCFC phase-out provides climate as well as ozone protection, there needs to be special attention to reducing emissions of their replacements, especially in refrigerant applications. The currently preferred choices of the refrigeration and air conditioning industry for non-ODS refrigerants are HFCs or blends of HFCs. These compounds generally

have GWPs that are lower than CFCs but about the same as or higher than HCFCs. These HFCs are chosen because of their superior safety characteristics and contribution to efficiency and reliability of equipment. Thus, to take advantage of these desirable properties and achieve additional climate protection, care must be taken to reduce emissions from equipment employing HFCs through improved equipment, better maintenance and servicing practices and recovery of the refrigerant at the end of equipment life. Current information suggests that about 20% of the amount of HCFC-22 contained in refrigeration and air conditioning systems escapes to the atmosphere each year through leaks, at servicing or at end of life. In addition, the draft report: "The U.S. Phase-out of HCFCs: Projected Servicing needs in the U.S. Air-Conditioning and Refrigeration Sector: Revised Draft Report, September 2006" (see: [http://www.epa.gov/ozone/title6/phaseout/ServicingNeedsRevisedDraftReport\\_September.2006.pdf](http://www.epa.gov/ozone/title6/phaseout/ServicingNeedsRevisedDraftReport_September.2006.pdf)) suggest that the amount of HCFC-22 actually reclaimed in the U.S. is only a fraction of what could be reclaimed.

The Montreal Protocol Multilateral Fund has played a constructive role by providing training and equipment to reduce equipment related emissions of refrigerants and could continue to play a role under an accelerated HCFC phase-out. In addition, there could be a role for CDM to provide incentives for more efficient equipment with either lower GWP refrigerants or certified reduced refrigerant emissions over the life of the equipment. Of course, where other low GWP refrigerants can be used safely, efficiently and in compliance with local regulations they should be chosen. In this regard DuPont intends to extend our innovative low GWP technologies under development to other applications currently using HFCs, including other refrigerant applications and foam expansion agents for insulating materials.

At the national level DuPont believes that both the environmental effectiveness and the flexibility for industry to meet consumer needs in the most cost effective manner could be enhanced through more reliance on market-based mechanisms. There are two areas in particular where we believe significant environmental benefits could be cost-effectively derived through new policies. There are significant amounts of high ODP and GWP CFCs and halons contained in existing equipment and products that are likely to escape to the atmosphere during their life cycle. In addition, there continue to be significant emissions of HCFC-22 used in refrigeration and air conditioning due to equipment leakage, poor service practices and/or lack of recovery at end of life. This suggests the need for incentives for better management of refrigerant in equipment and the capture and destruction of material at the end of equipment life.

The Special Report, jointly developed by the Intergovernmental Panel on Climate Change and the Technology and Economic Assessment Panel, "Safeguarding the Ozone Layer and the Global Climate System" (see [http://arch.rivm.nl/env/int/ipcc/pages\\_media/SROC-final/SpecialReportSROC.html](http://arch.rivm.nl/env/int/ipcc/pages_media/SROC-final/SpecialReportSROC.html)) brought to the attention of policymakers the significant amounts of CFCs and halons that are still contained in equipment. In the U.S., consumption and emissions of these compounds were controlled in three ways:

1. A limit was placed on the amount of new material that could be placed on the market through allocation of consumption allowances to producers and importers;
2. "No-venting" and other restrictions were put in place to reduce emissions of the compounds during service and at end of life of equipment; and
3. An escalating tax was placed on new material.

Of these, the first and third place an environmental value on the products to encourage appropriate market behavior, reduce leaks, and provide incentive for recovery during servicing and at end of equipment life for recycling into the market. However, when the material is too contaminated for economical recycle or market demand for recycled material is too low to place a sufficient value on recycling, then the material should be destroyed for optimal environmental benefit. Yet none of these controls provides a market driver for such destruction, suggesting a need for an additional market based incentive.

Looking forward to regimes for climate protection, we suggest two potential market-based regulatory approaches. In both cases, there could be special consideration for low GWP alternatives and applications with very low emissions.

We believe improved stewardship could be achieved by establishing a cap, on a carbon equivalency basis, of high GWP HFCs placed on the market, as was done on ODP equivalency for CFCs, halons and HCFCs. This could be combined with appropriate market based incentives (e.g., generation of carbon credits) for capture and destruction of the material at the end of its useful life. In fact, such a market based incentive program could be included in a GHG cap and trade system in the U.S. to encourage better management and eventual destruction of CFCs, halons and HCFCs by making such behavior economically beneficial. Destruction under such a program would provide both climate and ozone benefits.

Including HFCs in a GHG cap and trade system on a carbon equivalent basis would also create market incentives for environmental benefits. Under such a program carbon equivalent allowances would be required to be surrendered to place the compounds on the market, and carbon equivalent credits would be generated for destruction of the compounds. This would in essence imbed the "cost of carbon" in the value of these products, creating market incentives for improved stewardship.

In both cases the "environmental costs" associated with emissions of the compounds to the atmosphere would be incorporated into the market price. The result would be a flexible market-based system that would ensure that atmospheric emissions were reduced through limiting of leaks and increasing recovery at servicing and at end of equipment life; and would provide an incentive for development and deployment technology with lower environmental impact. Such an approach would also allow industry the flexibility to meet the environmental target in the most cost effective manner. Of course, as with any such market program, transparency and sound accounting would be important elements.

In summary, the Montreal Protocol has been an unprecedented success protecting both stratospheric ozone and the global climate system. That success could be enhanced through an acceleration of the current HCFC phase-out schedule in both developed and developing countries. Domestically, environmental effectiveness of implementation of international agreements could be increased by use of market based systems for the ozone depleting fluorochemical gases and, in the future under any climate change legislation, for HFCs. ✓

Thanks you for the opportunity to share our thoughts on this important subject with the Committee.

Chairman WAXMAN. Thank you very much, Dr. McFarland.

I am going to start the questioning by indicating that in the 1980's up to 1990, when the Clean Air Act was adopted, one of the major issues in the legislation was the depletion of the ozone layer by CFCs and other manufactured chemicals. When we tried to tackle this problem, industry told us that it would cause severe economic and social disruption.

At a January 1990, hearing, the Air Conditioning and Refrigeration Institute testified that it was "certain" that "We will see shutdowns of refrigeration equipment in supermarkets, we will see shutdowns of chiller machines which cool our large office buildings, our hotels, and hospitals." That is a direct quote from their testimony.

But instead of listening to these predictions of doom from the industry, we listened to the scientists who said that action was urgently needed if we were going to reverse the damage and stop further damage to the stratospheric ozone layer. We passed legislation to cut emissions of ozone-depleting chemicals in the United States by 90 percent, and, of course, the supermarkets and hospitals weren't forced to close their doors. We also passed that legislation before the Montreal Protocol was agreed to, because we felt that we needed to be the leaders by taking action here at home that was necessary while we advanced an international agreement.

Well, in a similar situation today with global warming, industry is telling us that controlling global warming pollution would be an economic disaster, but scientists tell us that we must act, that there are a variety of cost-effective steps that can be taken.

In fact, I believe that there are steps that we could take now that would make a big difference in slowing climate change and wouldn't break the economy, and one of these is the point that the three of you are making at this hearing, that is maximizing the potential of the Montreal Protocol to tackle global warming.

One class of ozone-depleting substances regulated by that protocol is HCFCs, and some HCFCs are also powerful greenhouse gases, in addition to affecting the ozone layer.

Now, the protocol currently requires developed countries to phaseout HCFCs by 2030 and developing countries to phase them out by 2040. Several countries, including the United States, have proposed speeding up the phase-out schedule in order to protect the ozone layer and climate.

Dr. Velders, your paper examined the potential climate benefits of an accelerated phase-out of HCFCs. If the phase-out were sped up and banks of existing ozone-depleting chemicals were addressed, what kind of drop in greenhouse gas emissions would you expect?

Mr. VELDEERS. Mr. Chairman, our study shows that, based on a mitigation scenario from IPC, which is based on potential cost-effective measures which can be taken now, that it can be reduction of about 800 or 900 million tons of CO<sub>2</sub> equivalent emissions by 2015, emissions reductions per year. The potential after that is even larger. So those are significant reductions, and they will help both for the ozone layer and it will help climate change.

Chairman WAXMAN. How would that reduction in greenhouse gases compare to the reductions required by the Kyoto Protocol?

Mr. VELDEERS. The Kyoto Protocol requires reduction by 2008, 2012, compared to 1990, of about 2 giga-tons, so 2 billion tons. So this is about half, which can reach by what the Kyoto Protocol is.

Chairman WAXMAN. These are enormous emissions reductions. By accelerating the Montreal Protocol, we could get some climate benefits, as large as half of Kyoto. That is equivalent, I understand, to 20 million cars off the road. Is that your understanding, as well?

Mr. VELDEERS. I haven't done the climate change.

Chairman WAXMAN. Mr. Thornton, have you heard any estimates of how much an accelerated phase-out would cost?

Mr. THORNTON. There have been some very rough ballpark figures put out in the order under the Montreal Protocol in the order of about \$500 million to \$1.5 billion, but I think that is a very general figure, but it is also dependent on knowing exactly how much HCFC is being produced in China right now, which is having an explosive growth in HCFC production, substantially motivated by this perverse incentive under clean development mechanism for HFC—

Chairman WAXMAN. Would this be equivalent to \$5 per ton of carbon dioxide? As I understand it, these emission reductions under the Montreal Protocol would be as cheap as 50 cents per ton. Mr. Thornton, would the United States have to pay the entire cost of an accelerated phase-out?

Mr. THORNTON. No. The way the Montreal Protocol works is that the U.S. contributes to the multilateral fund, and the other parties to it would also contribute. I believe the U.S. contribution is at the U.N. scale, which I think is in the order of 23 to 25 percent of that amount. But, Mr. Chairman, I just have to say that, in terms of protecting the climate, this is the best bang for the buck that can be found in the world today. This is the most cost effective, most efficient, most achievable program that can be done in the near term that doesn't have the same complexities as the sort of larger greenhouse gas emissions, so it is a can-do program that the international community could achieve and get done and have a huge victory over the next years.

Chairman WAXMAN. Thank you.

Mr. Davis.

Mr. DAVIS OF VIRGINIA. I am going to let Mr. Issa go first.

Mr. ISSA. Thank you. Thank you, Mr. Chairman.

Dr. Velders, I guess my first question would be: when Europeans come to us on Kyoto, we often say how settled is the science. Turning that around, when we go out to sell, particularly to Africa, South America, China, other developing nations, how settled is the science? How are we going to be viewed when we say, OK, we will move this up to 2020, maybe even 2018; we want you to move up to 10 years after us, particularly when you look at figures that say Kyoto was a fraud, Kyoto wasn't going to save as much, in many ways as moving this up would save, but we're arriving 8 years after we walked away from Kyoto. How is that going to be received? And I am all for it, but how settled is the science?

Mr. VELDEERS. I think the science, sir, on the ozone layer is well established. The report says no doubt that the CFCs are the main cause of the ozone depletion. Also, if you look at the force of the climate system, of the CFCs, and of the HCFCs in the affirmative

gases, its force is well understood. So the force on the climate system is well known. The effects from the forcing temperature change and wind pattern change to the climate change, there is more debate about that. That is more uncertain. But the forcing of the climate system, of the CFCs, and the affirmatives is similar to forcing of CO<sub>2</sub>.

Mr. ISSA. So, sort of reading that back to you, from a standpoint of ozone depletion and in closing the ozone hole, we will consider that settled science, but from the standpoint of, as I think you said, that by 2010 we will have avoided somewhere in the range of 10 to 12 billion tons of carbon dioxide equivalents, versus Kyoto targets by 2012, would have only avoided 2 billion. I am going to be in Berlin later this year meeting with our European partners again. It is a regular subject. Are they going to agree with these numbers? And how do I convince them, if they don't, that these numbers, that we need to push not just ourselves but the Third World to meet new targets?

Mr. VELDERS. The number of the 10 to 12 billion tons avoided of emissions of course have been somewhat of a scenario issue, what would have happened without Montreal Protocol. We showed in our study 2 to 3 percent growth in the CFCs without the Montreal Protocol, which can be considered a rather conservative growth if you look at the growth figures which were in the 1970's and 1980's, which were much more than the 2 to 3 percent we considered.

So I think that number might not be 10 to 12, it could be 8 or 9, but I think people will not question it. It is significantly larger than the Kyoto target.

Mr. ISSA. Very good.

Dr. McFarland, I guess I will come back to you with the same sort of point, particularly since the name DuPont usually represents breakthroughs in science, it also represents a little higher price. I am glad you smiled at that. What is the ballpark cost if we were to move up by 10 years? I am assuming at that point you can pretty well decide what all the alternatives are if, let's say, 10 years from now we are going to be completely phased out. You pretty well know what is available. We are not talking about breakthrough science, so—well, we are talking some breakthroughs. What will be the cost? Particularly when we look at methylbromide, which is continuing to live on, one of the ozone-depleting substances that we are still using even in the United States?

Mr. MCFARLAND. Well, I don't have any figures better than what Mr. Thornton put out of half a billion to 1½ billion. I can—

Mr. ISSA. Which is cheap. Let's be honest. When we look at other alternatives, there is nothing that is in those. We are looking at \$350 trillion to get to a zero carbon footprint, so this is a rounding area to that.

Mr. MCFARLAND. It is a very cost-effective way to both protect climate and ozone. In more general terms, accelerating a phase-out to some extent in the developed world, and specifically in the United States, shouldn't cost anything or be very cost effective because the existing laws on the books already are phasing out the equipment made with HCFCs in a couple of years.

For developing countries it is a very different situation than we faced during the CFC phase-out. When the CFC phase-out was started we didn't have the alternatives, we didn't know what they were, they weren't deployed. Now the alternatives to HCFCs exist. They exist in the developing world and, in fact, major developing countries like China are actually producing goods with the alternatives that are being sold in the United States, Europe, and Japan. So it is a very different situation, and the new equipment that is being made with these alternatives is more efficient, so there are benefits of moving away from HCFCs and into alternatives, so it should be a very cost-effective move.

Mr. ISSA. Thank you. Ten more questions, no more time. Thank you, Mr. Chairman.

Chairman WAXMAN. Thank you very much.

Ms. McCollum.

Ms. MCCOLLUM. Thank you, Mr. Chairman. Thank you, gentlemen.

So a problem is identified in the ozone layer. Action was taken. We had 191 countries join together in the Kyoto Protocol. Average Americans understood that there was a problem and that there was action to be taken, and that they wanted to be part of protecting the ozone layer. People who sold the products for the most part, they understood there was a problem. They wanted to know what they could do in making people be aware and have confidence in the new products that were coming online, refrigerators and air conditioners and that, although the industry did fight it.

The ozone layer has been protected from getting much larger, but really has not gotten smaller, so the success is there was a problem, it was identified, people came together, they did something about it, and what we have done is we have just stayed somewhat neutral in our battle against the ozone hole becoming larger.

So now we know that there is a problem with the chemicals that we are currently using, and we have to do something about that, but what I am hearing with the discussion going on down there is a couple of different things.

One, Mr. McFarland, DuPont has something that can come online. You are working very hard on it. I commend DuPont for doing that, but the problem in the developing countries, I want to go back to a little bit about what I am thinking I am hearing what is going on in the developing countries.

Are we still having a black market in which the banned chemical is being used? And if we don't address the CFCs and the black market that is going on there, what prevents us from being able to address a black market with the HCFCs, because if we don't address that and figure a way in which to make a black market not profitable, we will never get to the point where we want to with fully protecting and decreasing the hole in the ozone layer.

If you gentlemen could kind of, from your perspectives, say what we can do together to stop black markets from occurring.

Mr. THORNTON. Thank you. EIA has done extensive work on legal trade in CFCs and halons and have worked in close cooperation with the National CFC Task Force here in the United States, which is chaired by the Environmental Crimes Unit of the Justice Department and includes all the other main agencies working on

this issue. There has been substantial improvement both in the United States and worldwide on significant reduction on illegal CFC trade due to identification of the problem areas; additional restrictions, both in the United States and Europe and in other countries, to respond to that; and the substantive increase in capacity building and training of enforcement authorities all over the world. My organization has taken part in about 20 regional training seminars, even to the point where Chinese Customs uses EIA's video on how to detect illegal CFC smuggling to train their own Customs personnel. So that has been a very big success.

In terms of how to prevent it from happening with HCFCs, bringing forward the phase-out, stepping up the phase-out, and adding these reduction steps would be a very positive measure because it does give a monitorable and achievable goal and benchmarks that we can ascertain compliance, and it doesn't have a very big production at the end of the period of when they should stop to bring to a very rapid halt so that it is being stepped down and phased down over time, and it would allow the international community to better monitor and to detect any diversion of illicit material.

That said, there are certainly indications and some evidence already that there is an illegal trade in HCFCs even coming into the United States. China does have an explosive growth in HCFCs occurring now, and much of that is coming back into the United States. There are 6 or 7 million air conditioning units being brought into the United States.

Chairman WAXMAN. Thank you.

Mr. Davis.

Mr. DAVIS OF VIRGINIA. We have recently requested that the GAO conduct a study of the emissions offset programs because the companies that sell carbon offsets to U.S. consumers operate under virtually no standards. Furthermore, there are numerous efforts by States and the Federal Government to be carbon neutral, in part by purchasing these offsets.

Now, your testimony today regarding China's attempt to gain the system by emitting unchecked and excessive production of HCFCs in order to receive credits under the Kyoto Protocol's certified emission reduction credit system is disturbing. Does this manipulation of carbon credits by China impact the system of carbon credits that is currently so in vogue?

Mr. THORNTON. Well, the clean development mechanism is a work in progress, and it is just starting now. From EIA's point of view the whole situation and system would be a lot better if the United States was in there contributing to it, because the United States has enormous technical resources and expertise to help make the system work better. So some of these big projects are just getting up and running, but there is a significant commitment to take out HFC production, which is the chemical that produces the by-product—

Mr. DAVIS OF VIRGINIA. I have a followup, but let me ask Dr. McFarland, do you want to comment on that?

Mr. MCFARLAND. Yes. I would like to separate two things. One is under the current clean development mechanism, projects, HCFC-22 plants that were in operation as of January 1, 2001, are

allowed to participate under CDM. The current debate is about HCFC-22 plants that have come online since then. There is a significant issue there. Because of the value of those carbon credits, it is possible that the HFC-23 destruction CDM project could become the product and the HCFC-22 could become the by-product, because the 23 credits would be worth more than the 22 production.

So there is a significant issue there, and it is currently being debated under the framework convention on climate change and how to manage it there, but it is also here is the opportunity under the Montreal Protocol to begin to deal with the issue by accelerating the phase-out of HCFCs in developing countries.

Mr. DAVIS OF VIRGINIA. But don't you think then—I mean, Mr. Thornton said it is in its infancy in terms of understanding it—that Congress should continue to conduct more oversight into these carbon trading markets and get a better understanding?

Mr. THORNTON. I think the system could definitely be more robust. Again, we very much welcome the U.S. input to it and we think there are achievable solutions that could address the HFC issue in the clean development mechanism, for instance, by requiring a freeze on HCFC production for any country that is receiving HFC projects from CDM would be a simple way to further reinforce or freeze the HCFC production.

Mr. DAVIS OF VIRGINIA. All right. I will yield to Mr. Issa.

Mr. ISSA. Thank you, Mr. Davis.

I would like to ask unanimous consent to have Greener Computing placed in the record as a part of this question.

Chairman WAXMAN. Without objection.

[The information referred to follows:]

# GreenerComputing

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## Chemicals Trapped Between Treaties Undermine Progress on Climate

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NAIROBI, Kenya, Nov. 13, 2006 - Environmentalists attending the climate treaty negotiations in Nairobi have called for an immediate freeze in the production of a rapidly increasing greenhouse gas in countries that are receiving billions of dollars under the Kyoto Protocol's Clean Development Mechanism to mitigate its effects.

The environmentalists' appeal follows a report by UN experts that warned that the continued production of hydrochlorofluorocarbons (HCFCs) would add over one billion carbon dioxide-equivalent tons of greenhouse gases to the atmosphere in 2015 - double the total CO2-equivalent emissions of France in 2004. More recent estimates suggest the global warming impact could be up to twice as much as the report indicated.

Last week countries meeting for the ozone layer treaty in New Delhi issued an alarm specifically about the rising production of hydrochlorofluorocarbon-22 (HCFC-22). During the meeting, government representatives cautioned that unintended incentives created by the climate change treaty's Kyoto Protocol threaten to block their efforts to phase out HCFC-22, a gas used for air conditioning and refrigeration systems, and which has a global warming impact 1700 times that of carbon dioxide.

"We're shooting ourselves in the foot," said Alexander von Bismarck, Campaigns Director of the Environmental Investigation Agency (EIA), a green watchdog group attending the climate negotiations, "we are paying billions of dollars a year to make the problem worse."

Pointing to a decision made by Parties to the ozone treaty, the EIA and other environmental groups attending the negotiations are calling for urgent cooperation between the two treaties to eliminate the perverse incentives for over-production of HCFCs, caused by Kyoto Protocol projects, valued at \$2.4 billion for 2005.

The decision from the ozone treaty meeting calls on the technical experts of the Montreal Protocol on Substances that Deplete the Ozone Layer to conduct an investigation and report "on the influence of the Clean Development Mechanism on HCFC-22 production, as well as the availability of alternatives to HCFCs."

The Clean Development Mechanism (CDM) allows industrialized countries to buy emissions credits for the reduction of greenhouse gases in developing countries. The

majority of the early projects award credits for the destruction of a chemical called HFC-23, a potent global warming gas in its own right that is a by-product of the production of HCFC-22. Because these credits are so lucrative, they create a strong disincentive to stop the production of the source chemical.

Thus far, the CDM has registered 8 companies that produce HCFC-22 to be eligible for emissions credits. One such deal announced in early October, pays two Chinese companies \$1.02 billion to destroy about 100 million CO2-equivalent tons of HFC-23. To receive this money, however, they will have to produce about five times as many CO2-equivalent tons of HCFC-22.

In addition to a cap, the EIA is also calling on countries receiving CDM money to use the proceeds to accelerate their phase out of HCFC-22, destroy its by-product HFC 23, and invest in climate and ozone layer-friendly alternatives, such as hydrocarbons and ammonia based air conditioners.

"Parties to the Montreal Protocol took an important step to reach out to their colleagues in the climate treaty. Now it's time to reciprocate," said von Bismarck. "To avoid encouraging billions of tons of additional greenhouse gases threatening our climate, the Kyoto Protocol must immediately stop rewarding the production of this potent global warming gas and cooperate with the ozone treaty to accelerate its phase out," he continued.

Discussions are now taking place within the climate treaty about how to address the perverse incentive for HCFC-22 production created by the CDM. A draft decision is being circulated for Parties to consider, which environmentalists say falls short of solving the problem because it only addresses future production. They contend that continuing to reward existing production threatens future phase out of the chemical.

Argentina, which played a key role in developing the decision in New Delhi is active in the discussions. "The current growth of production and use of HCFCs has enormous implications for climate change as well as the ozone layer," said Mrs. Marcia Levaggi, from the Argentine delegation. "We hope the decision in Delhi will encourage urgent cooperation between the ozone and climate treaties," she added.

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Mr. ISSA. Mr. Thornton, let me understand this correctly. China is, in fact, gaming the system today as we speak by producing harmful HCFC-22 for the sole reason of destroying HCF-23 by-product, and we are allowing it to go on and, in fact, the Department of Justice should be investigating this and taking action. We should be, in fact, placing moratoriums on by-product imports so that we are not, in fact, providing the dollars for the very activity that we object to. Isn't that really the case, that we are giving China a pass today? It is like watching something, like watching a house be robbed and saying we need a stronger police force, isn't it?

Mr. THORNTON. Well, there is no law being broken, and that is the problem, because there is a disconnect between the Montreal Protocol regulating HCFC and the Kyoto regulating HFC, and what we are trying to do is to marry the two policies of the two treaties together to fast-track HCFC phase-out, at the same time cap, reduce, and stop the HFC.

Mr. ISSA. Well, I appreciate that, but I come from a State where right now we are about to stop bringing in coal-fired-produced electricity because we finally woke up and said we won't allow coal fire in California, but we're willing to energy launder or greenhouse launder or whatever you want to call it in California. California has taken the response. Shouldn't this Oversight Committee and this Congress take steps to stop the importation and financial gain of by-products which are, in fact, damaging our environment, something we could do today by not providing the avenue for those tens of millions of refrigerators and other items made, in fact, in a way that we would not allow them to be done under our protocol?

Mr. THORNTON. Yes. We think it would be a very good thing if the United States would stop import of equipment with HCFC in them, because the United States is a huge market and that would send a huge signal to the market and would have a very positive, very beneficial effect, with almost immediate impact.

Mr. ISSA. Mr. Chairman, although we don't have WTO experts here, I would appreciate it if we could look into it as a committee of whether or not we could do that without violating the WTO rules. Thank you. I yield back.

Chairman WAXMAN. Thank you very much. That is an excellent question. Let's see if we can get an answer to it.

Mr. Hodes.

Mr. HODES. Thank you, Mr. Chairman.

I want to thank the witnesses for appearing.

One question that I had when reading the written testimony of Dr. Velders and Mr. Thornton was the following: Dr. Velders, you wrote, "there is emerging evidence that the ozone layer is currently starting to recover. Full recovery is expected around 2050 to 2075." Mr. Thornton, you wrote, "While significant progress has been made to reduce the atmospheric concentration of ozone-layer-destroying chemicals, there is no definitive evidence demonstrating that the ozone layer has started to recover." Would you gentlemen explain to me whether there is a disagreement over whether or not the ozone layer has, in fact, started to recover, and, if so, how might that be resolved?

Mr. VELDERS. I don't think there is that much disagreement. In the last ozone assessment in June we talked a lot about what is recovery. What do you mean recovery? Do you want to have the situation back as it was before, let's say, the 1960's? Or do you want to see it not getting worse any more? What we now see, it is not getting worse any more, so we say, well, there are signals that it is not getting worse. And the theory says, well, in about 50 years or a bit more we should have a recovered ozone layer, so it is the start of the ozone getting better. I think that is what it is. We are not there yet. It will take at least another 50 years, and there are factors which could influence that. But it is not getting worse, so we can say it is the onset of recovery.

Mr. HODES. Do you agree, Mr. Thornton?

Mr. THORNTON. We concur with the scientific assessment. There are many other factors that come into play on this. For instance, President Reagan agreed on a phase-out schedule for methylbromide that should have ended 2 years ago production and use in the United States, and yet the United States is still producing and using millions of pounds of methylbromide, which is undercutting the alternative markets worldwide in developing countries that have already bitten the bullet and done that.

So there are all these other impacts that go along with, like, not full compliance with the requirements of Montreal Protocol. So there are other things that are causing unanticipated impacts because of there not being full compliance.

Mr. HODES. I want to followup on some of the questions about the perverse incentives to produce the HCFC-22 in order to gain the carbon trading credits of the HFC-23. What impact does the failure of the United States to be part of the Kyoto Protocol have on our ability to deal with this problem?

Mr. THORNTON. Well, from the point of view of the Environmental Investigation Agency, I mean, the United States has always been a leader in Montreal Protocol. It has had a historical leadership. It has been bipartisan. It is the biggest economy in the world. It is the most influential economy in the world. Not having the United States in Kyoto means that the U.S.'s vast experience, resources, and economic influence isn't being brought to bear, say, in the clean development mechanism, where you could have a huge impact fairly immediately. We think there is very forward-looking policy analysis occurring within different departments, and I think a huge contribution could and should be made. So, of course, we would like to see the United States in Kyoto. Whether it is not perfect or not, it would be a lot better if the United States was in there participating and inputting.

Mr. HODES. So that, while we have an opportunity to solve the problem under the Montreal Protocol, in terms of accelerating the elimination of HCFC-22, if we were part of Kyoto we would have much more ability to deal with the issue of this perverse incentive?

Mr. THORNTON. Yes.

Mr. HODES. Given that we are not in Kyoto, is there anything else that can be done in addition to the elimination of the HCFC-22 under Kyoto? Should we push somehow for HFC-23 to be removed from the carbon trading scheme?

Mr. THORNTON. I think that is a rather complex question which I would be happy to followup in a written response, but, as imperfect as the scheme might be now, this is starting to build something that—I mean, clearly it is better that the HFC is not going in the atmosphere. Clearly, it would be preferable for the international community not to have to spend billions of dollars to achieve that when we could spend a lot less in Montreal Protocol to achieve a phase-out. Clearly, a clean development mechanism should require a cap on HCFC production of any country that is receiving HFC phase-out funding. So there are things that could be done.

And certainly we would very much like to see the United States stop imports of air conditioners and other equipment from China, etc., with HCFCs because it is a huge market and it is a huge contributing factor.

Mr. HODES. Thank you.

Chairman WAXMAN. Dr. McFarland, you wanted to add something to that?

Mr. MCFARLAND. Yes. A couple of things I may like to clarify that I possibly didn't in my written or oral testimony. One is that the issue is around HCFC-22 plants that have started up since January 1, 2001, and it is these new plants, and currently they are not allowed, under the clean development mechanism, and there is a significant debate under the Kyoto Protocol and the Framework Convention as to whether they should. The question is, how do you manage that going forward? To my knowledge, that is strictly an issue of China, because I know of no plants outside of China that have begun an operation since January 1, 2001.

The second issue about this, whether WTO rules, you would violate WTO rules by banning the import, Europe is already banning the import of equipment containing HCFCs, so, I mean, if it doesn't violate there it shouldn't here, either.

Chairman WAXMAN. That is a very good point.

In September there is going to be a meeting to mark the 20th anniversary of the Montreal Protocol and they will discuss a number of ideas to modify the treaty in order to accelerate the phase-out of HCFCs. I would like to ask this panel about the proposals from the United States, which has four elements.

First, the administration has proposed moving up the HCFC phase-out dates by 10 years for both developed and developing countries. Do you think this is a good idea from a global warming perspective? Dr. Velders.

Mr. VELDEERS. Yes. I think if you forward the date of the total phase-out it will avoid additional emissions, especially after 2030, in developing countries, and it will be both the ozone layer and for climate change beneficial.

Chairman WAXMAN. Do you agree with that, Dr. McFarland and Mr. Thornton?

Mr. MCFARLAND. Yes.

Mr. THORNTON. EIA would recommend a more aggressive phase-out because we think it could be brought forward to 2007, or very soon thereafter. We don't think we should have to wait until 2010, as is said in the U.S. proposal, because the current HCFC production in China is very big and growing very quickly.

Chairman WAXMAN. You would support the U.S. proposal, but you would go further than the U.S. proposal?

Mr. THORNTON. Yes.

Chairman WAXMAN. OK. The United States has proposed adding intermediate HCFC phase-out steps for developing countries. Would this change to the Montreal Protocol also be beneficial? Dr. Velders?

Mr. VELDEERS. Yes. I think the intermediate steps are more important even than the base year, because they really bring down the future production. I have estimated, based on the total scheme for the U.S. proposal, by around 2030 it can avoid 600 to 700 million tons per year of CO<sub>2</sub> equivalents of greenhouse gases.

Chairman WAXMAN. Do you both agree, Dr. McFarland and Mr. Thornton?

Mr. MCFARLAND. And additionally it makes economic sense, because if you have a sudden drop to zero you have a lot of equipment out there that you have to service, so it makes both sense from the environmental and the economic standpoint.

Chairman WAXMAN. Third, the administration has suggested setting an earlier baseline date of 2010 instead of 2015 for developing countries. This is a fairly technical change. Can any of you explain what impact this would have on greenhouse gas emissions?

Mr. VELDEERS. If you set out a cap, like now is 2015, set a new cap for next 25 years, we don't know what will happen until 2015, like strong economic growth now in China and India is likely to increase. So bringing that date forward will reduce that cap and will affect a whole period of the future emissions and production. It will definitely have beneficial for both again ozone layer and climate.

Chairman WAXMAN. And, finally, the United States has proposed phasing out the worst ozone-depleting chemicals first. Do you all support that approach?

Mr. THORNTON. Yes, Mr. Chairman. Could I also just say to the last point that EIA also favors bringing the baseline forward, because if we wait until 2010 for Article 5, again, talking about China, we just have more explosive growth for the next 3 years, and probably they will rush to expand it so that the base will be at a very high level. We should get in as quick as possible to get that base set as soon as possible at the lowest possible level because, again, we will just be buying greater protection for the climate by having capped HCFC production at a lower level. So time is of the essence.

Chairman WAXMAN. Yes.

Let me ask this panel this question. Modifying the Montreal Protocol to speed up the phase-out of HCFCs wouldn't solve the global warming problem. We will need to do much more. I assume you all agree with that statement?

Mr. VELDEERS. Yes.

Mr. THORNTON. Yes.

Mr. MCFARLAND. Yes.

Chairman WAXMAN. You all believe that speeding up the phase-out of HCFCs is an important step that is worth taking if we want to seriously address global warming, so there is a lot of work to be done and, even if we don't do anything else, we will at least have

made an important accomplishment if we speed up this reduction of HCFCs.

Mr. VELDER. Yes.

Mr. THORNTON. Yes.

Mr. MCFARLAND. Yes.

Chairman WAXMAN. Mr. Issa.

Mr. DAVIS OF VIRGINIA. I will yield my 5 minutes to Mr. Issa.

Mr. ISSA. Thank you, Mr. Davis, and thank you, Mr. Chairman.

Mr. Thornton, can you name some of the companies that are essentially pollution laundering by producing in China these air conditioners and refrigerators?

Mr. THORNTON. There are quite a number of companies. I would have to go back and check our notes. I would be happy to followup with you and write to you following this hearing.

Mr. ISSA. Well, isn't it true that many of them are household word names that previously manufactured in countries where they would not have been able to produce this refrigerant? I am thinking of countries like America and Japan.

Mr. THORNTON. They are primarily Chinese companies.

Mr. ISSA. They are primarily Chinese companies?

Mr. THORNTON. Yes.

Mr. ISSA. And under what trade names, though? Under Chinese trade names?

Mr. THORNTON. They will come in under a wide variety of names, either Chinese names, or they could be produced for many other companies.

Mr. ISSA. Let me maybe give you some names in order for full disclosure. Sanyo, Panasonic, General Electric—these are names that they may be coming in under, plus some of well-known air conditioning names, wouldn't it be?

Mr. THORNTON. I am sorry? Are you talking about the actual air conditioning units?

Mr. ISSA. Air conditioners and refrigerators, yes.

Mr. THORNTON. Well, in the air conditioning you can go out to any WalMart, Sears, or anywhere and they're all stacked up and everything is made in China, so there are extensive household names.

Mr. ISSA. So I think full disclosure for us in the American audience, what we are doing is taking products previously made in America under agreements in which we would not be producing them the way they are producing them in China, we have shifted off-shore the production, but we have also shifted off-shore the pollution around the very agreements we signed. Isn't that a fair statement?

Mr. THORNTON. That is generally correct.

Mr. ISSA. Because at the time of the signing, these products were in much greater numbers made in America, along with the refrigerant. Dr. McFarland, pretty well correct?

Mr. MCFARLAND. Yes.

Mr. ISSA. I wanted those head shaking, because it is important for people to understand that in an effort to be a good steward of the environment we have to look to countries like China that, in fact, we have shifted our pollution to, and, in full disclosure, India, Brazil, also the case. The Europeans, would it be fair to say that

they have gone to Africa in the case of some of theirs, like their growing of orchids and flowers, things we are not talking about as much today. I will take that as a yes.

Chairman WAXMAN. Is that an affirmative answer to his statement?

Mr. THORNTON. I am sorry. I don't know about the orchids and flowers. I am not knowledgeable.

Mr. ISSA. As a strawberry producing State, California, we look at lot at where the methylbromide was used, and what we found is each of us moved it to countries outside of the protocol.

It is not good to give answers when you are up here. I should give questions only.

This will be my exit question, because it is an area of frustration. If China is cheating, call it whatever you want, and Brazil and India perhaps, not being mentioned as much today but major industrial producers, if they are cheating today and we need to bring them under the Montreal Protocol sooner and the Kyoto agreement, if it is to be effective worldwide, how do you best recommend that we come up with a strategy to stop cheating? You have given us one, which is stop importing products that essentially are laundering of these items which we could not produce here any longer, and I think that is an extremely good one, even though I am a free trader and it sounds protectionist. We are only talking about the pollution.

What other steps can we take to ensure that, for example, China—and I will just give you the best example. You mentioned the higher base level. They are producing, about every 8 days, a new coal-fired power generation plant. They are producing them with technology that is several generations older than anything being used in the United States, so they are, in fact, accelerating pollution faster than we are cleaning up. How do we, in fact, stop that behavior in the best way, in your opinion?

Mr. THORNTON. Well, in terms of this particular issue with the HCFCs and HFCs, clearly better cooperation between the two treaties would yield huge improvements. In terms of HCFCs, we generally support the direction the administration is going in, but, again, we think there should be a more aggressive target, because those targets will, in effect, apply controls under the internationally agreed convention to China, and China will be bound to comply with them. There are substantive compliance mechanisms available to achieve that.

Mr. ISSA. Last, but not——

Mr. THORNTON. Organizations like ourselves as well.

Mr. ISSA. I have used up the time once again. Thank you, Mr. Chairman.

Chairman WAXMAN. Thank you very much.

Ms. McCollum. Well, Mr. Clay hasn't had his first round of questions, so I will let him go first.

Mr. CLAY. I thank you, Mr. Chairman, and I thank the panel for being here today.

One question that I don't think has been asked is, gentlemen, 12 States have acted to regulate greenhouse gas emissions from automobiles. Earlier this week a new report by the U.S. Public Interest Research Group found that these tailpipe standards would reduce

carbon dioxide emissions by nearly 400 million tons by 2020. That is a major reduction and a major achievement, yet those emissions reductions could be negated by the chemicals out there right now in refrigerators and air conditioners. These banks of CFCs and HCFCs are a serious threat to our climate, aren't they, and clearly we need to address this looming problem.

I would like to ask each of the panelists, what are your recommendations for dealing with the threat posed by banks of ozone-depleting substances? Dr. Velders, we will start with you.

Mr. VELDEERS. Yes, you raise a very good point. The banks of CFCs currently in existing applications like refrigerators, but also in foams, the CFCs in there, they will, if you don't do anything, will get out into the atmosphere, and especially in refrigeration it will take about 10 years and in foams it will take much longer. But especially in refrigeration the sooner you can take some action to recollect the CFCs in refrigerators, mobile and stationary, and destroy them so that they don't get into the atmosphere, the sooner the better, because in 5 years time about half of it will be out in the atmosphere. The faster the action on the banks, the better, both for the ozone layer and for climate.

Where you should take those actions, there are no provisions in the Montreal Protocol to do this, but there might be other incentives that you can facilitate.

Mr. CLAY. Thank you.

Mr. THORNTON. The Environmental Investigation Agency thinks we should address the banks with better economic incentives to remove them. It won't be easy. It will be difficult. However, we believe the greatest lesson we can learn from the history of banks is to stop the banks from getting bigger. Because, again, every day that passes, every month, every year, there are millions of air conditioners being imported into the United States from China, each with a few kilos of HCFCs, and they are going to have to be addressed.

Because if eventually all those millions of units and all that HCFC is lost into the atmosphere, there is just a kind of time bomb waiting to happen, and to further have a negative impact on the climate. So that is why we have stressed with the U.S. proposal to the Montreal Protocol to be more aggressive at bringing the phase-out dates forward to set the cap as early as 2007 to prevent future growth in HCFC and the expansion of this industry.

Mr. CLAY. And I guess simultaneously we should also be addressing the smokestack issue also, the emission from the smokestack, or do you think that would negate it, too? Even if we reduce tail-pipe emission, will the smokestack offset?

Mr. THORNTON. For me personally, Congressman, yes, I believe we should be doing all that we can wherever the carbon emissions are coming from, whether they are smokestacks, tail pipes, or from staying in the shower too long in the morning, but we all have to do our little bit to reduce our carbon footprints.

Mr. CLAY. Thank you. Dr. McFarland, please?

Mr. MCFARLAND. Congressman, you bring up a very good point. The CFCs and halons have been phased out of production and consumption in the United States, and if we don't act soon it is going

to be an opportunity lost, because these things are continuously being emitted in the atmosphere.

The Montreal Protocol was a protocol that limited the amount that could be put into this equipment and on the market. It did not control the end of life use of the compounds. So it is probably too late to control them under an ozone regime; however, there may be an opportunity under a climate regime, because they are significant greenhouse gases. You might be able to allow some sort of a carbon credit for their capture and destruction and provide the financial incentive to get them out of the atmosphere, but every day we wait that one-time opportunity of destroying these things gets smaller and smaller.

Mr. CLAY. And let me real quickly ask how important is it for the Montreal Protocol to explicitly recognize the dual aims of protecting the ozone layer and combatting global warming? Anyone on the panel can venture.

Mr. THORNTON. Well, we believe that it is very important. In the past the Montreal Protocol has not taken sufficient account of the climate impacts of ozone-layer-depleting chemicals. We believe that this should be the basis of policy decisions in the future based on the scientific experience and evidence we have, and so we agree that the protocol should make its decisions fully cognizant of the impact of the climate emissions or carbon emissions, CO<sub>2</sub> equivalent emissions from these greenhouse gases that are also ozone depleters.

Mr. CLAY. Thank you for your responses.

Mr. Chairman, I yield back. Thank you.

Chairman WAXMAN. Thank you very much, Mr. Clay.

Ms. McCollum, do you wish to ask further questions?

Ms. MCCOLLUM. I just want to kind of followup. We have talked about the loophole that China has and the concerns about the black market, the role of Kyoto and Montreal in making for a healthier climate. Mr. Clay was talking about capturing the chemicals that are out there. But maybe we could hear a little more, especially from you, Mr. McFarland, about the alternatives that are out there for the HCFCs today, the cost of shifting to those alternatives, because 20 years ago, quite frankly, people screamed the sky was falling on industry if we did anything, and we found out quite the opposite. We survived and we stayed neutral with the ozone hole getting much larger. We have seen it get a little larger in 2005, but for the most part we stayed steady.

We need to improve. We need to raise up the standard from just staying neutral to moving forward. What kind of role do you see out there with industries such as DuPont who are working very much through research to do something about this?

Mr. MCFARLAND. Well, for the phase-out of HCFCs, alternatives exist today. You can buy the products with alternative compounds. They are on the market. The clock is ticking until the phase-out, for example, of HCFC-22 equipment that can be produced in the United States will be illegal. As of January 1, 2010, according to the laws that are on the books today, it will be illegal to use newly produced 22 in equipment produced after January 1, 2010. Mr. Thornton has raised the issue of right now there is no law on the books that would prohibit the import of equipment containing 22,

and that is something that needs to be worked on to close that so that it is a competitive issue for U.S. industry as well as an environmental issue.

So for the phase-out of HCFCs, the compounds exist today. In addition, we are looking toward the next generation of products. You may know that the European Union has passed an F-gas directive that will phase out the use of R-134A or HFC-134A in mobile air conditioning in new cars beginning in 2011. Over a year ago we announced that we had identified several candidate refrigerants that have only about 3 percent of the global warming potential of HFC-134A, and we are looking to apply that technology to other markets, as well. So we are optimistic as we go forward that we can provide continuously more sustainable solutions to meet the growing needs of the global refrigeration and air conditioning industry.

Mr. THORNTON. Well, EIA endorses the point of view that preference should be given to using cooling gases that have the lowest possible global warming potential. We don't want to have another transition chemical situation like HCFCs [sic] that has a lesser global warming potential compared to, say, HCFCs, but is still a significantly global warming potential when the chemical is mass produced, so we should be aiming for the lowest possible and then giving preference to encouraging those technologies.

Ms. MCCOLLUM. How difficult is it, if you have an older refrigeration unit? I know that recyclers are supposed to be on the watch, trying to not release these chemicals into the air. I know the automotive dealers were working very hard with refrigeration units in the cars when the switch was made not to release the chemicals. Is there anything that industry can do better?

Mr. MCFARLAND. This is why we are proposing more reliance on market-based mechanisms that provide the financial incentives for all of the technicians throughout the value chain to prevent emissions into the atmosphere. Right now the data shows that, of the R-134A, HFC-134A, for example, that is used in automotive air conditioning and other refrigeration systems, of the amount that is contained out there in equipment, about 20 percent gets into the atmosphere every year, either through leaks, poor service practices, end of life.

The same is true for HCFC-22 that is used in air conditioning and refrigeration systems, for example, your home air conditioner and supermarkets. And you are dealing with literally tens of millions of potential sources out there and tens of thousands of technicians that are going out there to work on those systems.

What you need is a market-based system that provides a financial incentive for them to recover it, so it is more cost effective for them to recover it than it is to allow it to escape into the atmosphere, and to maintain it in the equipment. So that is the basis for our suggestions that moving forward the implementation of agreements to improve environmental performance could be much more effective with market-based mechanisms rather than command and control systems that just say, Technicians, you cannot emit this into the atmosphere.

Chairman WAXMAN. Thank you very much, Ms. McCollum.

I want to thank the three of you very much for your presentation to us. I think this hearing has set a record that I think will be im-

portant for Congress as we consider the problems of the upper ozone, as well as the climate change matters. I hope this will also encourage the administration to push forward at the September meeting even more aggressively than they already are proposing, but they are proposing some good ideas and we want to commend them for that.

Thank you very much. That concludes our business for today. We stand adjourned.

[Whereupon, at 11:30 a.m., the committee was adjourned.]

[The prepared statement of Hon. Darrell E. Issa follows:]

**Statement of Rep. Darrell Issa  
Ranking Member, Domestic Subcommittee  
Committee on Oversight and Government Reform  
“Achievements and Opportunities for Climate Protection under the Montreal  
Protocol”  
May 23, 2007**

Thank you, Mr. Chairman for holding this hearing. I would like to associate myself with the remarks of Ranking Member Davis because I too see climate change as one of the critical policy issues of our time. Similarly, I welcome this opportunity to talk about the variety of ways we can work together to create a sensible policy to reduce greenhouse gas emissions.

While I understand that this hearing is intended to focus on the implications of the Montreal Protocol for climate change, it is hard for me to talk about the Protocol without mentioning the issue of the critical use exception, which relates to the use of Methyl Bromide. As the former Chairman of the Energy and Resources Subcommittee, I held several hearings on this subject, which detailed the special circumstances relating to this chemical and the lack of available substitutes. While the U.S. government has spent over \$200 million on research efforts in pursuit of a substitute, a wide scale alternative has yet to emerge, but the need for Methyl Bromide is as critical as ever.

However, the purpose of this hearing today is not to discuss the critical use exception, and so I will just say that the example serves to remind the Committee of the competitiveness issues that are at stake for the agricultural community and the manufacturing community when we discuss an accelerated timetable for the elimination of certain emissions.

Returning to the subject at hand, much can be learned from the negotiation and implementation of the Montreal Protocol. The success of the Montreal Protocol stems in part from the commitment of the leading nations to develop the necessary technology that allowed the participating countries to substitute away from harmful CFCs. Likewise, the U.S. and other nations serious about reducing carbon emissions today should focus at least part of their efforts on developing new technologies and carbon free energy sources. (I.E. Nuclear/carbon sequestration)

Another key aspect of the Montreal Protocol is that every participating nation has meaningful reduction obligations, so that every country is working cooperatively towards a unified goal. This lesson stands in stark contrast to the Kyoto Protocol, which exempted developing nations like China and India, whose emissions are quickly eclipsing our own.

However, China remains a controversial issue even with respect to the Montreal Protocol. According to a March 19 article in the New York Times, China is ramping up its production of HCFC-22, which under the treaty it is permitted to produce until 2016. The reason for this steep increase appears to be a provision in the agreement, which

allows for China to produce at their 2016 level until 2040, thus creating an incentive for China to push the cap as high as possible today. This gamesmanship is not productive and does not serve the intent of the treaty. Accordingly, I support the efforts of the Bush Administration to negotiate an accelerated phase-out of HCFC for all countries.

Finally, I look forward to hearing the testimony of today's witnesses, which seems to show that the Montreal Protocol has even bested the Kyoto Protocol in the area of reducing greenhouse gas emissions! If so, then the debate over how to reduce greenhouse gases should not exclusively focus on reducing carbon dioxide emissions. Other known and identifiable gases contribute to the greenhouse effect, and their contribution to any warming as well as their reduction should be considered as part of the global solution.

I yield back the remainder of my time.

